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EDITORIAL.

FEW OF OUR readers, we think, were aware of the fact, stated by a correspondent elsewhere, that France has re-entered the list of gold-producing nations, after an absence of many years. The experimental working of complex low-grade ores seems to promise at least a moderate success. Its results will be observed with interest.

THE PRELIMINARY report of the United States Steel Corporation for the last quarter of 1904 shows a much greater recovery in earnings and business than had been anticipated by most outsiders. That business was fast improving after the depression of the early part of the year was generally known; but the full extent of the gain comes rather as a surprise. The prospects for the current year are good, so far. Abundant business is in sight, though at a lower range of prices than prevailed two years ago.

IN ANOTHER column, Mr. W. H. Seaman brings up the discussion on the adoption of the metric system, which has rather lapsed of late. It is an important matter, and the longer the adoption of the rational system of weights and measures is postponed, the more difficult it becomes. We hope to see others take up the subject.

THE SELLING PRICE of quicksilver during the year 1904 dropped gradually, and since the close of the year there has been a further fall. The metal, which was sold a year ago at about $44 per flask of 75 pounds, is now quoted at $37.50 to $39, with a rate of about $1.50 less for export sales. The production in California is growing, and a considerable quantity is now coming from the mines in Brewster county, Texas. In fact, production is increasing all over the world, as is shown by the note published on another page. At the same time, the consumption in mining has been nearly stationary, if it has not decreased slightly, owing to the very general use of the cyanide and other steel processes. The annual output in the United States exceeds the consumption, and, consequently, a considerable quantity has to be exported to China and elsewhere, where it must meet the competition of Spanish and Austrian metal. As

there is a duty upon the metal in this country, export sales are always made at a figure below those for domestic consumption. The California miners some time ago formed a pool, under the terms of which the export sales are divided among the different companies, thereby equalizing the prices which they receive.

THE EXTRACTION of gold from seawater is of perennial interest to the amateur metallurgist, and to the fraudulent company promoter. Some New England experiments with the latter class are still in the memories of Massachusetts investors. We are not prepared to say under what category come the moving spirits of extensive experiments now being carried on at St. Helens, on the Isle of Wight, in England. In this case, however, the promoters claim that the quantity of gold existing in a ton of seawater varies from 0.5 to 1 grain. This rather exceeds the quantity admitted by scientific men. The promoters, moreover, claim a recovery of 16 to 20 cents per ton, a claim which would seem to indicate that they are very poor arithmeticians. The parties who are furnishing the money had better study up some of the experiences of the plant which was in operation in Maine.

ON ANOTHER PAGE appears a continuation of the discussion on the composition of calcine. We welcome the contribution, difficult as the problem is, and certainly no task in commercial analysis is more complicated than the identification of the respective oxidation states of the sulphur, copper and iron concerned—at least from the theoretical standpoint. Indeed, the problem is uniquely classical. The determination of the various degrees of oxidation would be difficult for the competent expert, in the best equipped laboratory and with unlimited time; what it means for the commercial chemist, cramped both in leisure and in laboratory, can be well imagined. But in spite of all this, it is possible that experience may show the value of certain systematic determinations as a guide in checking the quality and the degree of the roast, however these determinations may be interpreted by theory. We know of cases where chemists are required to report the ferrous and the ferric iron in calcine, and where these reports are regarded with respect by the calcine foreman, though the chemists themselves are utterly skeptical as to the true interpretation of their own figures. The case is rendered doubly difficult by the possibility of reaction between oxide and sulphide, soluble and insoluble, the rôle of oxidizer and reducer changing most capriciously. We also know of cases where the determination of ferrous and ferric oxide has been discontinued, sometimes the sulphur being reported as such, and sometimes as part sulphide and part sulphate (or sulphite) sulphur. No rule can be given to suit all cases, and each superintendent must use his judgment for the personal equation of his own calcine. Meanwhile only good can result from the courteous and fraternal exchange of experience by the members of the chemical guild.

IN ANOTHER COLUMN notice is given of a committee, appointed by the Institution of Mining and Metallurgy, of London, on standardization. The purpose of this action is commendable in every way. The names of the central committee include a fair proportion of American representatives of mining engineering, which is ample evidence of the conscientious desire to give the work the cosmopolitan character that it should possess. From size-of-mesh to mine-accounting, and from mine-assay-plans to common technical names, there is need of improvement all along the line. It is time that actual reports should match a common standard of form and meaning. This nominated committee has accepted a large responsibility; but it also has ideals, the realization of which will mean much to public service.

Consolidation on the Rand.

In his recent correspondence from the Transvaal, Mr. J. H. Curle has been urging the amalgamation on a large scale of a number of Witwatersrand mines; supporting his case by a number of instances. The general point is that there are a number of the outcrop mines, with large equipments, which have only a few years of life before them. If these companies have to be wound up, and their mills and other property sold, there will be certainly a loss to the stockholders. On the other hand, the newer deep levels have to be supplied with mills and machinery at heavy cost. By consolidating groups of mines properly situated, the stockholders of the outcrop mines might secure a continuance of their investments, by moderate concessions, while the deep-level shareholders would save largely in the cost of equipment. Without citing Mr. Curle's special instances, it is sufficient to say that he makes out a very strong case. His argument is likely to appeal especially to the stockholders in those outcrop groups, which are nearest to prospective exhaustion. A further argument is the greater economy possible in the operation of large groups of claims, of the character of those on the Rand.

The chief obstacle in the way of such consolidations is the ownership, or control, of many mines by the large financial houses, which have played so important a part in Rand development. In many cases where consolidation would seem desirable from a mining standpoint, there are conflicting interests and rivalries, which are, apparently, very hard to reconcile. It is possible, however, if not altogether probable, that some adjustments could be effected. In the interest of the best mining, it seems desirable that this should be done. At any rate it is a matter which appeals to the most careful consideration of stockholders; and it is to be hoped that the articles will command the attention which Mr. Curle's comments usually receive—and deserve.

Shot-Firers in Illinois.

In another column we give the text of a bill now before the Illinois legislature, which provides for the compulsory employment of shot-firers in the coal mines of that State, under heavy penalties. The motive for the introduction of the bill is understood to be the increase in the number of accidents resulting from the use of explosives in the mines. Undoubtedly there has been such an increase; but whether the obligatory employment of shot-firers would work a decrease in accidents is another question. They are found now in nearly all mines of importance, and it is not to their absence that the larger number of casualties is due.

The fact is, that since the run-of-mine basis was adopted in certain Illinois districts, there have been increasing complaints of carelessness in placing shots. The miner's object is to bring down the largest possible quantity of coal in a given time, regardless of its condition, or of the risk incurred in blasting. The results have been a large increase in the proportion of

slack, to the detriment of the operator; and an increase in the number of accidents, to the injury of the miner. The latter, however, does not seem to care, as long as he can secure a larger tonnage and consequent higher wages.

A bill was passed by the legislature last year, restricting the number of shots which could be placed at one time and prescribing limits to the quantity of powder which could be used; such limits being carefully graded according to the thickness of the coal-seam. It does not appear that special pains have been taken to secure the enforcement of this law; at any rate it has made little or no difference in the accidents.

As the mining agreement now in force runs until 1906, no change can be made this year. When a new contract is in order, it is quite probable that a strong effort will be made to drop the run-of-mine basis, and to return to the practice of other States, where screened coal is the measure of wages.

Mining History in California.

A local paper, the *Republican*, published at Placerville, in El Dorado county, in California, is making an attempt to obtain notes of all rich strikes in quartz and gravel in that county, since the gold was first found; the object being to obtain a record of the best gold discoveries that have been made and their exact location so far as possible as an index to future prospecting. The original discovery of gold in California was made at Sutter's Fort, near Coloma, in that county. It is recognized that the only people who can furnish the facts desired are the miners who were in the county in early days, or other miners who have talked with them. These men are gradually "passing over the divide," and this is an attempt to gather the data before it is too late. The notes furnished are to be published in the newspaper and in a pamphlet. It is sought to learn the particulars about every exceedingly rich piece of old placer ground; its extent; its location as exactly as may be given; what it produced by the pan, by the day, by the clean-up, or in total; whether the gold was coarse and its value and fineness; every pocket or series of pockets of any great magnitude; how they were found; who worked them; what they produced; what the formation was like; and especially the situation. The compiler is also trying to obtain data about the pay-shoots of ore on the larger quartz veins of the county; notes on the best results from the deep gravel channels, with comments on the points of existing streams where these have cut the ancient channels; finally, particulars about large nuggets found in the county, location, weight and value, date of discovery, etc.

It may be said in this connection that it is very difficult indeed to obtain any authentic history of the early-day mining in any of the counties in California. In fact, it is even impossible to ascertain how much any one county has produced as a total. It was not until 1880, when the United States Mint began to gather the statistics of annual production, that any segregation by counties was attempted. Before that period, the only available statistics concerning mining output was derived from the annual reports of the late John J. Valentine, superintendent of Wells, Fargo & Company's express. He made a report yearly by States and Territories, but did not give the yields of separate counties. Of course, interested parties in the respective counties have made up estimates of total yields of their own counties, but the aggregate of these estimates more than doubles the recorded total yield of gold of the State. There was really nothing to base them on. The plan of the El Dorado paper is an excellent one, as considerable material may now be gathered concerning the mines of that county. It will be impossible, however, to obtain exact data of yearly output, as no records were kept, and large amounts were carried away to commercial centers by individual miners who kept their results to themselves.

The Genuineness of Fallibility.

To err is human; to acknowledge it is divine. About a century and a quarter ago it became the custom for analysts to publish their actual results; the total frequently, usually, fell below 100 per cent, and it is almost pathetic to note the ingenuous and superfluous insertion of the deficit required to bring the total to the theoretical normal. This deficit was called 'lost,' and frequently amounted to three or four per cent; but it stamped the work with the quality of genuineness. Later, as methods improved, and as the sum of the ingredients determined came nearer the desired total, it was unnecessary to add this lost margin. At present, the actual total of an analysis, involving ten or twelve ingredients, will fall anywhere between 99 and 101 per cent; and this limit is in good standing. The theory of clean analysis is that the plus and minus errors will be so distributed that they will largely counterbalance each other. Actually more analyses add to 99+ per cent rather than 100+ per cent; this would indicate either that the losses in analysis are slightly greater than the gains, or that the slight deficit is due to other ingredients overlooked or ignored. But woe to the tyro who persists in evening up his figure to the theoretical 100 per cent; there is no clearer evidence of inexperience or insincerity. The recognition, and the confession, of the limit of error make the password of mutual credit. The same is true of the determination of any one of a dozen constants of nature, for example: The value of 'g' in gravity; the mechanical equivalent of heat; the solar parallax; the value of the ohm; the atomic weight of oxygen; the wave length of the D_1 line of sodium in the spectrum; and even in pure mathematics, the value of *pi*. In all these instances, the results of independent observers, respectively, hover close about the true, but unknown, theoretical mean, the pursuit of which is never relaxed. Indeed, this pursuit, the romance of the accurately inaccurate, is the most fascinating story of history. It is nothing less than the narrative of the passion of man for 'absolute' truth; and while no one knows, in any special case, just what are the exact figures, yet it is known that they are corralled within the order of decimals indicated by the mean of the best results. This guarding and safeguarding of human fallibility has many illustrations. All of us can recall the old days when we went proudly to our professor with the results of some analysis which totaled 99.999 per cent, only to be told: "Very well, Mr. Blank, very well; but don't let that happen again. It is too good." And then we went off into a corner and thought it over, as we realized that our apparent accuracy was only the deceptive result of some exceptionally favorable circumstance, and that a fair 99 or 101 per cent would doubtless have represented our real ability in the real composition. Personal skill of manipulation will naturally bring one analyst very near this ideal mean. Thus

that artist, Hillebrand, is almost in a class by himself in his power to precipitate, and wash, and filter, to the correct degree; we can but admire such work. Other names might be mentioned—the lamented Rowland, Kelvin, the Kohlrausch family, Rayleigh (the real discoverer of argon), and even Darwin, who measured in a field where measurement is largely a matter of judgment, as in his classical test of the intelligence of angleworms. But the lesson is plain. The faith of man can direct his faithful micrometer and balance—and we press on to the truer and the more exact.

Market Conditions.

The metal markets show comparatively little change during the week. Copper has been quiet, so far as domestic buying is concerned. Little business has been actually done for export, but inquiries are increasing, and the prospect of a settlement of the German coal miners' strike is tending toward an improvement of business in Europe.

In tin and lead there is absolutely no change. The demand in tin is chiefly for spot and near deliveries. Spelter is somewhat weaker. The Joplin ore market has also declined, but mining in that district has been seriously interfered with by the weather.

Silver has been quiet but firm, under the influence of a steady demand for Indian account. Prices have shown little change during the week and remain firm at the close.

The lull in buying in the iron and steel trades still continues. Mills are generally busy, but new orders are not plentiful just now. The demand for pig iron, however, continues strong, and anticipations of activity in trade through the year are unabated.

The Western coal trade has been seriously disturbed by the cold and stormy weather, which has brought, on the one hand, increased demand for fuel, while, on the other, transportation has been delayed, and deliveries are difficult.

In the seaboard bituminous trade bad weather has also caused much trouble. Blockaded railroads have made deliveries slow and irregular, while storms at sea have limited the coastwise trade.

The anthracite trade is normal, except so far as transportation has been delayed by the weather. Demand is naturally very strong.

Metallics.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

When a rock has been exposed to pressure by movements of the earth's crust, it is apt to develop cleavage along planes determined by the direction of the pressure. The cleavage planes may lie at any angle to the bedding planes, or may even coincide with them.

Pyrite, on decomposing in moist ground, sometimes gives rise to an acid sulphate of iron. This may attack aluminous minerals, giving rise to solutions of sulphate of iron and alumina, which come to the surface as alum springs, or, if no alumina is present, merely as iron or chalybeate springs, which are of more or less—usually less—medicinal value.

Recent science indicates that the gap separating the ponderable from the imponderable, is about to disappear; nothing is stable, unless it may be the ether of space.

Sir William Ramsay states that not more than one-tenth of an ounce of radium is known to be in existence, and that the amount of radium salts, commonly referred to as radium, is very small.

British Coal Supplies.

Forty years ago some excitement was caused in Great Britain by the assertions of Professor Jevons that the coal supply of Great Britain would not last a hundred years. The result was the appointment of a commission, which, in 1871, submitted an elaborate report, putting the available coal in the country at 90,207,000,000 tons. Two years ago, another commission was appointed, which has just made a preliminary report, estimating the quantity of unmined coal, in seams one foot thick, or over, at depths less than 4,000 ft., at 100,914,000,000 tons, in round figures. In addition to this the Geological Committee reports that there are certain large quantities of coal existing at depths greater than 4,000 ft., and certain other deposits in areas outside of the coal fields now worked. The commission's estimate is based entirely upon the fields now yielding coal.

The production in 1904, in round figures, with an estimate of its disposition, was as follows, in long tons:

	Tons.	Per ct.
Used at mines	18,000,000	7.6
Transportation—railroads, etc.	16,000,000	6.8
Iron and steel industries	30,000,000	12.8
Other factories	58,000,000	24.7
Illuminating gas	15,000,000	6.4
Domestic purposes	33,000,000	14.0
Used at home	170,000,000	72.3
Exported	65,000,000	27.7
Total	235,000,000	100.0

The coal sent abroad includes 48,000,000 tons sent to foreign countries, and 17,000,000 tons used by steamers engaged in foreign trade. The coal used in coasting steamships and in steamboats in local trade is included under the head of transportation.

Summing up all the supplies referred to above, we have the following estimate of coal in existence in the United Kingdom:

Commission's estimate	100,914,000,000
Under 4,000 ft. depth	5,239,000,000
In areas outside present fields	39,483,000,000
Total tons	145,636,000,000

If we assume that all this coal is available, it would last, at the rate of consumption shown in 1904, for somewhat over 600 years. But the average rate of increase in consumption for 30 years past has been 2.5 per cent yearly; and if this increase should continue, the supply will be sufficient for less than 300 years. Three centuries is a long time in the life of a nation, and it would be easy to assume, therefore, that Great Britain has no cause for apprehension as to the future of her industries, on the score of fuel supply.

We must remember, however, that not all the coal expressed in the figures given will be available. The estimates include all seams known, or supposed to be, one foot in thickness, or over. But, without considering quality, there must be some part of this coal which cannot be considered available. It is easily apparent, for instance, that a seam one foot thick cannot be worked commercially at a depth of 3,000 to 4,000 ft., except under very exceptional conditions; while only thick seams can be regarded as promising profit at depths of over 4,000 ft. Moreover, the estimate makes no allowances for waste and loss in mining, which are inevitable, as every operator knows. Fifteen years ago the Pennsylvania Anthracite Commission put the loss of coal at one ton for each ton actually sold and consumed. For British mines—or for our own at the present time—this is too high; but the waste is an amount entirely too large to be neglected in any estimate for the future.

On the other hand, there are opportunities for many savings in consumption. The Commission thinks that 50 per cent of the coal used in manufacturing could be saved, if all engines and boilers were of the highest degree of efficiency. Of course, this is too much to expect; but there is room for great improvement. The extended use of the gas engine may be an important factor in economizing fuel. Another feature is the recent establishment in the coal country of large central stations, where slack and waste are converted into electric power, through the medium of the gas producer and gas engine. These not only save the consumption of much good coal, but also utilize a part of the waste from mining.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

ANALYSIS OF CALCINES.

The Editor:

Sir—I note some comment in the JOURNAL upon my method of calcine analysis, published in your issue of June 9, 1904.

Mr. J. W. Richards (*Review of American Chemical Research*) states that few will agree with me that undecomposed FeS_2 occurs in the calcines. "It should be rather Fe_7S_8, magnetic pyrites."

Mr. A. T. French, of Batoum, South Russia, makes tests to prove the accuracy of calling the copper (soluble in 20% H_2SO_4) cuprous oxide, and the propriety of asserting that all ferrous oxide in the calcine is soluble in acid of that strength. He finally intimates that it is hardly proper to consider the sulphide of iron in the calcine as undecomposed pyrite.

Mr. French treats 2 grams of an ore, carrying 5% copper as sulphide, with 20% H_2SO_4 and some ferric oxide, and obtains 2% copper in solution. It is surprising that he should have stopped here in his attempt to prove the inaccuracy of my deduction regarding cuprous oxide. The solubility of cuprous sulphide in dilute H_2SO_4 and ferric oxide does not necessarily prove that it is soluble to the same extent in presence of other compounds.

The action of ferric salts upon sulphides is generally known. In fact, the reaction of ferric salts with copper sulphide has afforded a process for the metallurgical treatment of low-grade ores, at Rio Tinto, Spain, for instance.

The following are some experiments I made to determine the accuracy of the determination of cuprous oxide; the different compounds were taken in the proportions found in a gram of calcine; the treatment was invariably in a valve flask, with 20% H_2SO_4, boiling 15 minutes:

(1) 100 mg. Cu_2S and 200 Fe_2O_3, with 50 c.c. acid; copper obtained was 20 mg.

(2) 170 mg. of iron wire were dissolved in valve flask with 50 c.c. acid; 100 mg. Cu_2S and 200 Fe_2O_3 added; boiled 15 minutes; copper in filtrate was 20 mg.; the idea was to see if ferrous salt would influence the solubility of the copper sulphide.

Checks more nearly approaching the calcine were then made up; precipitated silica was used to represent the silica and alumina; no pyrite being included in the next proof, the constituents were raised proportionately to make one gram.

(3) 192 mg. iron wire dissolved in dilute sulphuric as before (to represent FeO); 78 Cu_2S, 205 Fe_2O_3 and 93 Cu_2O were added; copper in filtrate was 79 mg. 79 Cu = 89 Cu_2O, or 4 mg. less than Cu_2O taken.

(4) The following was made up to represent the calcine as determined by the method:

Silica, 312 mg.; Cu_2O, 77 mg.; Cu_2S, 65 mg.; FeO, 206 mg. (160 Fe wire dissolved as before), Fe_2O_3, 170 mg., and FeS_2, 150 mg. Copper in filtrate was found to be 71 mg. (equivalent to 80 Cu_2O, or 3 mg. more than amount of Cu_2O added.

Mr. French states that it is a mistake to treat the calcine with 20% H_2SO_4 for ferrous oxide. He tries treatment of his calcine with 75% H_2SO_4 in a sealed tube; he heats for several hours at 210°, and obtains more ferrous oxide than by treatment with 20% H_2SO_4 in the method adopted.

It would seem that if a 20% solution of acid with ferric oxide is found to attack copper sulphide, a 75% solution, with ferric oxide, and heated in a closed tube to 210°, would readily attack pyrite.

Mr. French quotes Fresenius, but that authority does not state that the ferrous oxide in calcine requires such strenuous treatment. He does state, however, that, while almost all artificial ferrous compounds will dissolve in hydrochloric acid, yet many native compounds cannot be so dissolved. The ferrous oxide in calcine is not a native compound.

As regards the criticism of Mr. Richards, I will state that those who have had experience with MacDougall calcine of this district will agree that raw pyrite occurs therein and in considerable amount. If there is any magnetic pyrite in this calcine, none can be recovered.

(5) Another check was made to represent a gram of the calcine. Assuming that one-half the sulphur in the calcine (which had been calculated to FeS_2) was actually present as Fe_7S_8 (magnetic pyrite), 40 mg. of natural magnetic pyrite was used, the rest of the constituents being the same as before. In this case the proof was treated with 20% HCl for the better solution of the ferric oxide. The boiling was continued in the valve flask until all ferric oxide was dissolved. After filtering and drying the residue, 26 mg. of magnetic pyrite was recovered by a magnet. It might be added that the magnetic pyrite was readily soluble with generation of H_2S when treated with strong HCl in a beaker. However, on treating in a valve-flask in the case of the blank as made up, only a faint generation of H_2S occurred at the beginning of the treatment; it seemed that the reaction was the same as that of ferric chloride on copper sulphide—that is, a solution to chloride, with liberation of free sulphur. Upon treating a gram of calcine in the same manner as the check, namely, boiling down with 20% HCl until all ferric oxide was dissolved, no magnetic material was found in the residue, and the iron and sulphur actually analyzed to FeS_2, after removing free sulphur with carbon bisulphide.

Now, a stronger solution of HCl would readily attack FeS or Fe_7S_8, with generation of H_2S; this liberated H_2S would be detected either by odor, or it would precipitate copper sulphide as a result of the soluble copper in the calcine. Such a precipitation of copper sulphide in a flask or beaker could be detected readily, for it would form a film on the surface of the solution and climb the sides of the containing vessel. Nothing of this kind occurs on treating this calcine with HCl.

A faint test for H_2S may be obtained (by boiling the calcine in a flask with HCl and conducting the distillate into a solution of lead acetate); but it is insignificant.

I will add that the author of this scheme had no idea of submitting it as perfectly exact on such material; nor did he have any intention of proposing the method for all calcines. However, it will do for metallurgical purposes in the case of calcines of this district.

JNO. P. WALKER.

Great Falls, Mont., Jan. 23, 1905.

ELECTRO-CHLORINATION.

The Editor:

Sir—In the JOURNAL of Jan. 19 Mr. William E. Greenawalt further attempts to justify electro-chlorination at the expense of cyanidation. No scientific man should attempt to prevent experimentation; it is the life of industry and no industry is in a healthy condition without it. It is, however, neither necessary nor justifiable to duplicate large and expensive experimental plants; at least a second should not be erected until the first has been proven successful, as such unwarranted proceeding leads the public to believe that the mining industry is largely a matter of uncertainty; and thereby both the investor and the industry suffer injury.

Cyanidation, as practiced throughout the mining world to-day, leaves little room for improvement; if one would establish a record for cost of operation, including labor, chemicals, precipitation, melting and refining, marketing bullion, also power, light, heat and contingent expenses, he must reach a figure below $0.35 per ton; the above does not include crushing nor roasting when necessary. These facts should make a careful man hesitate, before promulgating a new and untried process.

No objection is raised by me to standard chlorination; it is a time-honored process, and in some cases, no doubt, gives better results than any other process; but the same is also true of the cyanide process; conditions favorable to good extraction in either chlorination or cyanidation are much the same, namely, finely divided and free value; when these conditions are not present, neither process will extract a high percentage. Cyanidation has been applied to ores of low value for the reason that the process is less expensive to operate. But, it does not follow that cyanidation is restricted to ores of low grade; Cripple Creek ores prove this.

Mr. Greenawalt informs us that he is familiar with the Boulder county plant referred to by me. This is without doubt true, and it is also presumably true that he is familiar with the report, made by myself, of the test run for cyanidation; if he had been as true to the whole report as he was to a part, he should have stated that the total value recovered was more than he credits, and that a serious loss of solution was due to faulty construction of the leaching-vats, a defect which did not become apparent until the vat was loaded; hence not all the extracted value was represented in the bullion. It would be unjust to the milling company to state the precise extraction, as the mill was to be operated as a custom mill. Mr. Greenawalt attempts to cast discredit upon these operations, by stating that "now the interesting feature of this transaction is, that, although these changes were made over a year ago, only 238 tons of ore were treated. The mill was shut down soon after, and not a pound of ore has been treated since." This is a misleading statement, the plant was rigged, for a temporary test-run, and it treated as such 238 tons. The result was satisfactory to the company, if not to Mr. Greenawalt, and it was decided to arrange the mill for cyanidation; this work was begun soon after the run was over, which was in March, 1904, but the company soon found itself in litigation, which caused the delay. This constitutes no proof of failure of the cyanide process.

Mr. Greenawalt, with seeming disregard for quantitative statement, goes on to tell us that the circulation of 251.3 tons of solution through 238 tons of ore demands far more power than that required to revolve chlorination barrels, plus the power necessary to generate chlorine for the same amount of ore; let us see. The height of the storage-tank above the sump-tank was approximately 30 ft.; we will grant that more than this tonnage of solution was used (in general practice 1.5 tons of solution is used per ton of ore, in the total time of treatment), say, 3,000 lb.; this, to the height of 30 ft., equals 900,000 ft.-pounds, and divided by 33,000 ft-lb., which equals 3 horsepower minutes or 1-20 horsepower hour per ton of ore. Mr. Greenawalt, in the JOURNAL for Dec. 15, states that 24 horsepower hours, for total treatment, are required to rotate a barrel when loaded with 10 tons of ore; this per ton would be 2.4 horsepower hours; to this he should add the power necessary to generate the chlorine, and still he tells us that this, as compared with the pumping of the solution "fades into insignificance."

It is encouraging to note that Mr. Greenawalt admits that the electro-chlorination process, as applied to the ores in question, did not extract the value (this was my original statement), and he states, that, had he obtained as sweet a roast as we had, good results would have certainly followed his efforts; as proof of this he states that "chlorine is chlorine." I am aware of the fact that chlorine is chlorine and that gold is gold; and that, in chlorination practice in Colorado, it has been proven that the mere saturation of water with chlorine is insufficient to extract the available value, and that chlorine sufficient to cause an appreciable pressure is generated from chlorine alone.

Mr. Greenawalt states that "Previous to the erection of this mill the ore was sent to a chlorination mill in Boulder, where it was successfully treated." I presume he refers to the Atlas mill, which was erected in Boulder and was operated a short time; and which, after standing idle for several years, was burned. As to success in treatment, I have no data further than the value of the tailing, which assayed $4 per ton, and which was afterward cyanided, with what success I do not know. Mr. Greenawalt also states that "With at least three cyanide mills closed down within a radius of 1.5 miles from the mill referred to, with not a single cyanide success in the district, etc." This statement is true of one cyanide mill (though I am informed by the assayer, who was in charge at the time the mill was in operation, that the extraction was 90%), which is still closed down. The reason given by those connected with the mill at that time is that there was a division among members of the company, and while this was being settled a mortgage was foreclosed, the property going to parties not in the milling business. The two other mills are mythical, unless reference is made to the one in question and to another under erection at the present time.

Mr. Greenawalt states that in the chlorination of ores there is no difference between molecular and nascent chlorine; let us look at this from a scientific point of view. When matter passes, of its own accord and without external energy, say, from state A to state B, it follows from the law of conservation of energy that, while in state A the matter passing was invested with potential energy, which in passing to state B becomes kinetic; let this energy be represented by E, which would appear as heat and be lost or added to entropy. If it becomes necessary to reverse this process and pass from B to A, it follows that E units must be supplied from some external source; this must follow from the thermo-dynamic law of conservation of energy. Now let us apply this to the case in question. When chlorine is set free from chloride compounds, it appears as nascent chlorine, which we will call state A; under normal conditions, it will combine with itself, as Cl_2 (if nothing more basic is present) and pass to state B; this action liberates E units of heat which is absorbed by the solvent, if in solution, if not it will be lost through radiation. Now before this chlorine can combine with basic metals, it must again return to state A, and in this operation E units of energy must be supplied from some force external to the chlorine; this, under working conditions of a chlorination plant, must come from the reaction between the chlorine and some metal in the ore (gold or otherwise); if the basic metal has a high solution-pressure, like sodium or potassium, E would be readily supplied; but, if the metal has a low solution-pressure, like gold, E would become a commercial factor. If E must be supplied by some metal other than gold it follows that more of this metal would be desolved than if the chlorine were in state A; for the reason that the solution of gold becomes a function of the first.

I contend that E is a factor not to be neglected; and I am informed that charging a barrel with liquid chlorine and water alone will not give the required results. Mr. Greenawalt's statement that a few bottle-tests will prove his position amounts to nothing, as every man knows who is familiar with metallurgical work; the irregularity of distribution of value would confuse and mask any nice points.

WILLIAM H. DAVIS.

Boulder, Colo., Jan. 30, 1905.

INTERNATIONAL WEIGHTS AND MEASURES.

The Editor:

Sir—I should like to submit the following summary of considerations, with regard to the adoption of an international system of weights and measures. These suggestions, I think, may be regarded as axioms, since they are self-evident.

1. Convenience and utility require the whole world to use the same weights and measures for all purposes.

2. The varieties of weights and measures in use have greatly diminished in number since the Middle Ages, as regards both the internal and external commerce of nations.

3. From the cosmopolitan point of view, natural competition has eliminated all but two systems, the international or metric and the British systems.

4. The existing British system began with the adoption of Bird's yardstick by the British Parliament in 1760, and has been since modified. Every part of it received its original shape by accidental selection, without regard to any other part.

5. The international system was carefully planned by some of the best trained men of the eighteenth century, and has not required alteration in any respect since its first presentation.

6. Almost all men who have studied the subject recognize three essential points of excellence in a system of weights and measures: a decimal notation, the fewest factors possible, and correlation of dimensions between the different units.

7. The British system has none of these merits, the international system has them in the highest possible degree.

8. The British system has not been and will not be adopted by any other govern-

ment; the international system has been adopted by nation after nation, till it is the official system of the whole civilized world except England; is in actual and exclusive use by the scientific men of all nations, and is in the laws, literature and industries of England and the United States, as well as all other nations.

9. England herself is adopting the international system, in three steps: the first was taken in 1897, when it was made permissive in trade and commerce; the second was taken in 1900, when it was ordered taught in the public schools, and the third is in the present bill for its *compulsory use*, which has passed the House of Lords and its first reading in the Commons.

10. When this bill passes the Commons, the United States will be left alone with its mongrel system, which is not now all British, nor anything else, and we shall occupy a position similar to that of Russia with her antiquated calendar after all other nations have adopted the Gregorian system.

11. The international system is not now new to the United States. It is in all our school text-books on physics and chemistry, and other scientific works, in which during the past fifty years it has displaced the British system. Many of our university students are more familiar with grams and centimeters than with ounces or pints; it is in watch and chemical factories, and in our silver coins and electrical measurements by law. The international system has got its foothold; the only question is, how long will it take the expiring British system to die. Its struggles are disagreeable.

12. The British system is a serious obstacle to education and effective work in this country The cost of teachers and the time of students expended on its useless intricacies amount to hundreds of thousands annually, to say nothing of the subsequent waste in manufacturing affairs. The world-wide use of the international system justifies making it an important subject of education apart from the question of its introduction here. The absurdity of present conditions is shown in one of our leading engineering colleges, where, in the building for original research and theory the international system alone is used, while in a building a few meters distant the result of this patient, careful study has to be all transposed into the British system to be accessible and useful to the average workman.

13. The British system is nowhere used by foreigners except in goods bought from England or the United States, and they avoid it as much as trade conditions will allow in their tables, computations and text-books. For example, see 'Der Ingenieur's Taschenbuch,' the engineering hand-book of Germany, published by the Society Die Hutte. For the necessity of standardization from an international standpoint, see this JOURNAL, September 22, 1904, page 466.

14. The international system has begun to affect textile industries and screw cutting. At one end of the series known as textile processes we have a confusion of 24 'yarn counts,' originating in England chiefly; at the other end we have the manufacture of dies, wholly in the international system. As factors of opinion, they balance each other.

In screw cutting, we find nine different systems. As citizens of the world our weights and measures are exactly in the same condition our money was in the United States at the close of the Revolution, and the only way out of the confusion is to adopt the international system because it is the best and is used by most people.

15. The systems of screws in use are: (1) The French system; (2) the Swiss standard; (3) the British Association standard; (4) the international or metric standard known as the S. J. standard; (5) the sharp or V-standard, makers' pitch, still found in Europe; (6) the acme standard; (7) the pipe-thread standard; (8) the Whitworth standard; (9) the Sellers or United States standard.

16. The first four are wholly metric, No. 2 and 3 being used in watchmaking everywhere. Metric spark plugs for automobiles are well known here. The acme is for heavy square-thread screws. The Whitworth system is used almost exclusively in England and largely on the continent of Europe. The United States system has never been used anywhere else to any extent, and is not likely to be. Neither England nor the United States will adopt the system of the other. Hence the international system is the only system whose universal use is possible or probable. If the government should introduce the systems in the post office and mint as a beginning—it being already partially in use in those departments—it would render its complete adoption easy and educate the multitude without difficulty.

WM. H. SEAMAN.

Washington, Jan. 24, 1904.

At the Ravenswood works of the Consolidated Gas Company, of New York, the boiler fuel gases contain 14% of carbon dioxide, and the gases leave the boilers at a temperature of only 400° F.; from 8 to 8.5 lb. of water are evaporated per pound of anthracite fuel.

As long ago as 1840 there was erected in France a plant for the manufacture of potassium ferro-cyanide from the nitrogen in the atmosphere. At one time this plant turned out almost a ton of product a day. Now electrolytic works at Niagara Falls, N. Y., are converting carbide of barium into barium-cyanide by passing over it air from which the oxygen has either been removed or converted into carbon monoxide.

Shot-Firing in Illinois Mines.

The following bill has been introduced in the Illinois Legislature:

"Section 1. Be it enacted . . . that all persons, companies, corporations, lessees or owners of mines, who are engaged in operating a mine when or where miner or miners are employed or engaged in mining where gas exists, or where two or more pounds of powder or its equivalent is used for any blast, shall and are hereby directed, under penalty, to secure practical, experienced men, who shall be known as shot-firers, so that there will be a sufficient number at all times to inspect and do the firing of all blasts prepared in a practical manner in said mine or mines.

"Section 2. The shot-firers shall, at the expiration of each day's operation of the mine, post a notice in a conspicuous place at the mine, in which shall be indicated the number of shots fired; also the number of shots they did not fire, if any, and giving reasons for firing same. In addition, they shall also keep a permanent daily record, in which shall be entered the number of shots or blasts fired, the number of shots or blasts failing to explode, and the number of shots or blasts that, in their judgment, were not properly prepared, and which they refused to fire, giving reasons for same, the record to be in the custody of the mine manager, and to be available for inspection at all times by parties interested.

"Section 3. The superintendent or mine manager shall not permit the shot firers to do any blasting, exploding of blasts, or to do any firing whatever, until each and every miner or employee is out of the mine.

"Section 4. Any wilful neglect, refusal or failure to do the things required to be done by any section, clause or provision of this act on the part of the person or persons herein required to do them, or any violation of any of the provisions or requirements hereof, or any attempt to obstruct or interfere with any person in the discharge of the duties herein imposed upon them, or any refusal to comply with the provisions of this act, shall be deemed a misdemeanor, punishable by a fine of not less than $100, and not to exceed $200, or by imprisonment in the county jail for a period not exceeding three months, or both, at the discretion of the court: *Provided*, that whoever shall discover that any section of this act, or part thereof, is being neglected or violated, shall order immediate compliance therewith; and in the case of continued failure to comply, shall, through the State's attorney, or any other attorney in case of his failure to act promptly, take the necessary legal steps to enforce compliance therewith through the penalties herein prescribed."

The bill is now with the Senate Committee on Mines and Mining.

Mining Stocks.

(Full quotations on pages 295 and 296.)

New York. Feb. 8.

The contraction of sales and systematic fluctuation of quotations suggest professional trading. Absence of any important news bearing on mining shares rather handicaps speculators who desire to interest public buying. Amalgamated Copper shows small sales at $75.50@$73.625, and Anaconda at $27.50@$26.75. On curb, Greene Consolidated, of Mexico, attracted little attention at the quotation of $26.50 @$26.25, and British Columbia at $6.375 @$6.

In the gold and silver section little was done. The feature was Ophir, which has risen to $8 on belief that dividends would be resumed.

American Smelting & Refining shares were dwelt in moderately, the common bringing $86.75@$85.75, and the preferred, $119.875@$118.875.

The recent auction sales were 8,508 shares Tidal Oil Co., at $16 for lot; 9,598 shares Bookwalter Steel & Iron Co., $22 lot; 4,965 shares Knickerbocker Lubricating Oil Co., $5 lot; $4,166 shares Boston & Indiana Lubricating Oil Co., $7 lot; 100 shares New York Standard Gold Mining Co., $5 for lot.

Boston. Feb. 7.

The market has been a rather uneventful one the past week, although active at times in certain stocks. As a rule prices are somewhat lower than a week back, but there are a few exceptions to this. Trinity, which showed such activity late in January, has dwindled now to normal transactions and the price has also suffered. The larger part of the business done during the activity was of a manipulative sort, and the orders were watched without doubt. The price reached $13.62 on Wednesday last, and for two days the sales amounted to almost 90,000 shares out of a total of 240,000 shares listed. Subsequently, however, the stock fell back to $10.50. The superintendent is expected in this city shortly, and will have plans and specifications for a mill to show the directors. Greene Consolidated is off fractionally for the week to $26.25. New England holdings of this stock have been materially increased of late.

United States mining got out of the rut it had been in so long, and on large trading advanced $2 to $24, closing a fraction under this. It is said that Director Adolph Lewissohn is having the property examined for his own personal benefit. The smelter is now earning good money. Mr. Lewissohn lately took on about 30,000 shares of this stock. President Evans is said to own about 110,000 shares. On the resumption of ore shipments by the Boston Consolidated to the Bingham smelter, the stock of the former spurted from $6.25 to $7.12½, but has lost a part of it. Samuel Newhouse, who resigned as a director and president of the Boston Consolidated, has withdrawn his letter of resignation.

There is a noticeable demand for some of the cheaper Lake mining stocks, such as Mass and Michigan. The latter became active some weeks ago, but Mass has been in demand lately and is up $1.62½ for the week to $12. Tecumseh, which is thought to contain the Kearsarge lode, rose to above $3, but suddenly broke to $2 on free offering. It easily rallied to $3, however. Rumors of an assessment on Victoria caused the stock to weaken slightly and it closed a fraction lower at $4.75. Winona fell to $11.50, but recovered most of the decline to $12. Shannon has been offered quite freely and declined $1 to $6.75. There are reports that conditions at the mine are not entirely satisfactory. Centennial is off $1.25 to $17.50, and appears to be without support. Allouez has lost $1 to $19.75; Franklin, $1 to $10.50; Isle Royale, $1 to $25.50; Mohawk, $1 to $52; Osceola, $1.75 to $93.25; Utah less than $1, to $41.62½. Wolverine made its highest record to-day by touching $112; being up $4, from a week ago. Tamarack is in better demand at $132 and up. There seems to be steady absorbtion of this stock. Calumet & Hecla has sold at $680@$675. This company has been a buyer of mineral lands lately. Old Dominion is quiet at $27 and under, and Copper Range has varied from $68 to $69.62½. Amalgamated is a fraction lower for the week, at $74.12½. St. Mary's Mineral Land rose to $67.50.

On the curb, Arizona Commercial has sold at from $4.12 to $3.87½, and Majestic, new, at from $1.75 to $3. Sales of Seneca are reported at $37@$36.

Colorado Springs. Feb. 3.

The mining stock market has been quite active the entire week. The volume of business done on the local exchange has been about the same as last week, but there was a slight falling off in prices at first, the result of profit taking. The lower prices induced buyers to take advantage, and the trading on Friday showed that the market had gained nearly all that it lost in the beginning of the week.

The activity in the camp is the cause of the active stock market. The demand for ore cars in Cripple Creek was never so great as at the present time. All railroads are overcrowded. The mines are not able to get transportation for all their output. There is a great demand for leases. The output for January was $1,891,000.

Acacia sold to-day at 11¾; Anaconda at 22½; Black Bell at 9; Elkton at 71c.; El Paso advanced from $1.66½ to $1.70. Gold Sovereign sold at 12½c. Work sold ex-dividend from 15¼ to 15½. The trading in the prospect list was quite heavy during the entire week.

Salt Lake City. Feb. 3.

Only two mines operated in Utah paid dividends in January—these were the Utah Consolidated of Bingham, which distributed its semi-annual dividend of $450,000, and the Silver King, of Park City, distributed its regular monthly dividend of $100,000. The trading done on the floor of the Salt Lake exchange during the past week has been confined largely to Tintic and Park City stocks, but Silver Shield of Bingham proved to be quite a feature in the last two or three days, being stimulated by what appeared to be rather important developments in the mine. May Day and Little Chief of Tintic recorded some heavy deals. The former opened weak, but afterwards strengthened, only to be knocked down again to a lower figure than that which prevailed at the beginning. Inquiry for Daly-Judge was manifested, and a few lots were supplied at $6.50 a share. New developments in the Tetro mine created a demand for that stock, and it advanced. Only five shares of Daly-West came out; these went at $15. New York Bonanza went up from 40 to 49c. a share, but closed slightly weaker; there has been some inside buying; in fact, the greater part of the demand came from that source. Wabash closed weaker, while Yankee Consolidated remained steady around 35c., with very little stock changing hands. Columbus Consolidated was beared, which resulted in only a few hundred shares being brought out.

San Francisco. Feb. 2.

The market for the Comstock shares has been rather moderate this week, but quotations were fairly steady. Ophir sold at $6.75; Mexican, $2.10; Consolidated California & Virginia, $1.70; Hale & Norcross, $1.30; Sierra Nevada, 40c.; Gould & Curry, 20c. per share.

On the San Francisco and Tonopah exchange business was fairly good, and a good many stocks changed hands. Tonopah of Nevada brought $12; Montana Tonopah, $2.37; Tonopah Midway, 90c.; Tonopah Belmont, 85c.; MacNamara, 45c.; Original Bullfrog, 35c. per share.

On the California exchange trading in oil shares was rather light, but showed a better tone than for some time past. Among the quotations noted are: Twenty-eight, $12; Kern River, $9; Oil City, 67c.; Home, 45c. per share.

Monterey. Feb. 8.

Exchange on New York which has been for some weeks at 202,125, has dropped to 202.

Mining stocks continue dull, though there have been some sales of Dos Estrellas at $3,500; Victoria, $52; Bessie, $7; Reina y Anexas, $7.50; Oro Nolan, $120; Mexican Venture Syndicate, $9; La Paz of Matehuala, $231; San Rafael, $760; San Francisco of Pachuca, $95; Santa Gertrudis, $75, and Cinco Senores at $13.

Coal Trade Review.

NEW YORK, Feb. 8.

ANTHRACITE.

The almost unexampled duration of the present cold weather is proving to be as much a cause of anxiety as a source of profit to the dealers. The main line railroads have recovered from the blockade of the last storm, and heavy loads are arriving regularly at the New Jersey ports. To ferry this across to Manhattan or Long Island, or to ship it towards the Sound ports is where the difficulty lies. Trips up the Sound are taking more than twice their customary time.

Traffic conditions in the city are nearly as bad, and stocks in the cellars are being so heavily drawn upon that a brisk trade may be expected as soon as deliveries are facilitated.

An abundant supply being close at hand, prices have not been affected, but remain at the same figures; namely, domestic, $4.75 for broken, and $5 for egg, stove and chestnut; for steam sizes, $3 for pea, $2.25@$2.50 for buckwheat, $1.45@$1.50 for rice, and $1.30@$1.35 for barley, delivered at harbor points.

BITUMINOUS.

The Atlantic seaboard soft coal trade is tied up, on land and water, by the cold weather. The market for spot coal is entirely speculative, varying from day to day, and being apparently dependent upon the momentary needs of consumers. At this writing, a good grade of steam coal

has been offered at $3@$3.10, f. o. b. New York harbor shipping port, while a few days ago, a price of 50c. above this was reported. These speculative prices are all based upon coal loaded and located at some central point so as to be available for consumers upon the same day as ordered. Producers are merely taking care of their regular contracts, and are avoiding even such business as far as possible, on account of difficulty in moving boats.

Trade in the far East is calling for a good amount of coal, but vessels are practically unavailable for Eastern shipments. The same may be said of coastwise trade. Such vessels as are in the ice in Delaware or Chesapeake bay, are reported practically helpless. Norfolk and Newport News shipments are being delayed on account of slow transportation over their feeding roads.

Trade along the Sound is embarrassed for several reasons, the principal one being the want of proper despatch shown by the New York, New Haven & Hartford railroad at its terminals. Large demurrage bills are accumulating on all shipments. This has sent prices up, and we are told that $5 has been paid for coal in cars at New Haven. This is not thought an exorbitant figure, all things considered. Another incidental trouble is due to the ice, the jam at Whitestone being impenetrable for coal boats except at turn of the tide.

The New York harbor market is speculative at this time, but little coal being available. Embargoes are placed on shipments to one or two of the New York harbor points, Port Reading being entirely, and others partially closed.

All-rail trade is calling for a large regular quota of coal. Prices remain strong, and when any new business offers, an advanced price is demanded. Transportation is slow and irregular, and car supply continues at under one-quarter of the requirements.

Coastwise vessels are not offered for any business, and for this reason, quotations are lacking. Philadelphia and Baltimore are closed by ice. Rates from New York to around the Cape are quoted at 75@80c for 800 to 1,000-ton vessels.

The figures collected by the *Black Diamond*, of Chicago, show that the total receipts of coal in 1904 at the upper lake ports were 3,563,871 tons of anthracite and 8,864,833 tons of bituminous; making a total of 12,428,704 tons received by water at these ports. In addition to this 45,000 tons of anthracite and 493,471 tons of bituminous coal were reported at Fort William, in Canada. The largest receipts of anthracite were 1,056,676 tons at Superior and Duluth—which should be taken together—960,930 tons at Chicago, and 864,655 tons at Milwaukee. The notable receipts of bituminous coal were 3,164,128 tons at Superior and Duluth, 1,847,679 tons at Milwaukee, 425,956 tons at Hancock and Houghton, and 332,721 tons at Escanaba. The Chicago lake receipts of bituminous were very small, as that city gets most of its soft coal by rail. This does not include a considerable tonnage which goes to the Canadian ports on Lake Huron.

Birmingham. Feb. 6.

The extremely cold weather which set in last week has had a little effect on the coal production in this State. Several of the mines for the past three working days have had a falling off in their usual output. The demand for coal is holding up well. The larger consumers, the railroads, have recently become uneasy again and fuel agents are looking after steady deliveries of the product. There is demand for all the coal being mined. Prices are strong, lump coal in particular being high. The mines affected by the strike of the union coal miners continue to report increased outputs, except in Bibb county. The Blocton mines are not making as much progress as others.

The work of sinking new shafts near Ensley, by the Tennessee Coal, Iron & Railroad Co., announced recently, may mean much more than it shows on the face. Contracts have been let for two shafts. It is understood that these two mines will concentrate the coal mining operations in the Ensley territory. As soon as they are in full operation extensive development in coke manufacturing will be taken up, including, perhaps, a by-product plant. The sinking of the shafts may consume at least eight or ten months. At the same time, the work started in the neighborhood of Henry Ellen, in the upper portion of Jefferson county, will be pushed. The Tennessee company is preparing itself for future needs in coal and coke. The Sloss-Sheffield Steel & Iron Co., with non-union and convict labor, is producing enough coal to meet its own needs and place some on the market.

The presence of John Mitchell, of the national organization, may bring about a consideration of the end of the strike of the United Mine Workers in Alabama.

Chicago. Feb. 6.

Both anthracite and bituminous have been in larger demand in the last week, as a result of the coldest weather of the winter, but the market for both is satisfactory to few dealers. Sales of anthracite are still largely in small lots, though it must be said that the aggregate tonnage for the last week has been up to if not in advance of the record for the corresponding week a year ago. The demand for anthracite, however, is now general, and prospects are good for a continuance of a fair trade up to the end of the season. Dock supplies are holding out well, and probably will last through the winter. All-rail shipments are growing in importance and are fairly satisfactory, having been delayed but little, generally, as compared with last year. There is still some scarcity of chestnut, but complaint on this score is not nearly so common as it was a month ago. Throughout the year collections on anthracite sales have been slow, and this condition has not been remedied by the coming of cold weather.

Bituminous continues to suffer from the mining of more coal than can be consumed economically—at least as regards Indiana and Illinois products. There has been very keen competition on Carterville, and low prices which has affected other western coals injuriously. Indiana and Illinois domestic lump sells for $1.90@$2.40; steam lump, $1.60@$1.90; run-of-mine, $1.25@$1.75; screenings, $1@$1.40. Hocking has been reduced from 3 to $2.70 for run-of-mine, and other grades in proportion, three-quarter inch lump being now $2.90, and domestic lump $3. These reductions are said to be the result of the severe competition that Hocking, with other bituminous coals has had to face under the conditions of the last three months. Early in the winter Hocking was advanced 20c. to 30c., but the advance did not hold. Smokeless is easing off from the strong position it held; the demand, though still fairly good, is not so large as it has been; run-of-mine brings $2.90@$3.15, as heretofore.

Cleveland. Feb. 7.

There is hardly any change in the fuel situation in this territory. The coke trade continues rather easy, with a good supply all through. There is a good demand also, but the supply being free, prices are inclined to be easier. The market holds at $3 for good 72-hour foundry coke, although some sales are made as low as $2.75. There is a good demand for furnace coke at $2.50@$2.75. The average would about strike the market.

The steam coal trade is still dull and without much life. It is apparent there is a tremendous production and the stoppage of the movement by the snows and cold weather only lessened the supply here, without affecting the prices. The amount on hand was a little too large. Prices stiffened a little, however. The general quotations now are about $1@$1.05 at the mines for both Ohio and Pennsylvania coal, run-of-mine. There is a good demand for slack and the prices hold as they have been, the supply being rather short. Quotations are 70@75c. at the mine for Ohio slack, and 60@65c. at mine for Pennsylvania.

Very little if anything has been done toward the lake coal situation for the ensuing year. Rates have been discussed only in a haphazard sort of a way and no agreement as to prices has yet been reached.

Pittsburg. Feb. 7.

Coal.—The severe weather and the inability of the railroads to supply a sufficient number of cars almost caused an entire suspension of mining operations in the Pittsburg district. On Saturday but 25% of the requirements was furnished, but the supply yesterday and to-day is a trifle better. Mills along the rivers that depend on coal shipped by water had to get fuel by rail for a day or two, until the ice was broken in the pools enabling the moving of barges loaded with coal. A famine in the local market is threatened and prices are much firmer. Quotations are about the same for large tonnages and are based on $1.10 a ton for run-of-mine.

Connellsville Coke.—The demand for coke is almost unprecedented and, owing to the shortage of railroad cars, it is impossible to take care of all the orders. Offers of $3 a ton are freely made for quick delivery of furnace coke. Contracts for future delivery are being made at prices ranging from $2.50 to $2.75. Foundry coke is held at $2.85@$3.10. The production for the week amounted to 261,712 tons, a decrease of 4,266 tons compared with the previous week. The shipments aggregated 10,583 cars distributed as follows: To Pittsburg and river points, 3,933 cars; to points west of Pittsburg, 5,468 cars; to points east of Everson, 1,180. This was an increase of 41 cars.

San Francisco. Feb. 2.

Mr. J. W. Harrison's circular of this date says: "Since our last there have been only two arrivals of coal from Australia; total, 4,640 tons. The small deliveries of Australian coal since the beginning of December last, in all, 14,509 tons to date, leaves our stock on hand of Colonial coal considerably diminished; furthermore, there are but two cargoes due to arrive here this month, hence there will be a depleted stock of foreign coal here in March. There are nineteen vessels on the engaged list to carry coal from Newcastle to this port, with a carrying capacity of about 45,000 tons; it will be several months hence before a number of these cargoes will be delivered here. The prices now ruling re-

main unchanged, and the quantity changing hands is materially enlarged, caused by the prevailing rainy weather. Colonial freight rates on coal remain firm at unchanged rates; about 15s. per ton is the prevailing quotation. There have been eight deliveries from British Columbia in January, aggregating over 25,000 tons, which makes it evident that Australia is a small factor in furnishing us with our coal necessities. Up to date, we have had a most seasonable rainfall to insure us a large cereal crop this spring; if our anticipations should be realized, there will be a large demand for tonnage to carry our products to foreign markets; this should be a profitable market for disengaged tonnage this year, which may induce liberal coal shipments from Australia."

For Pacific coast coals, in large lots to dealers, quotations are: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, also in large lots to dealers, prices named are $8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside; Colorado anthracite brings $4. For Eastern coal, quotations are largely nominal, supplies being light. Pennsylvania anthracite is $14, and Cumberland $13. For English coal, quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade. Feb. 8.

The tonnage of coal and coke exported from the United States during the year 1904 is shown below in comparison with the previous year's figures:

	1903.	1904.
Anthracite	2,008,857	2,228 392
Bituminous	6,303,241	6,345,126
Total coal	8,312,098	8,573,518
Coke	416,385	523,100
Totals	8,728,483	9,096,618

The coke went chiefly to Mexico. The exports of both kinds of coal were distributed as follows:

	1903.	1904.
Canada	6.535,863	6,577,954
Mexico	846,412	880,747
Cuba	439,759	519,227
Other West Indies	220,496	253,585
France	6,920	10,948
Italy	49,220	69,930
Other Europe	27,049	63,476
Other countries	184,379	197,651
Totals	8,312,098	8,573,518

Outside of Canada, which is, naturally, our best foreign market, Cuba and the West Indies took the largest amounts of both kinds of coal, the trade with which countries showed also the greatest increase over the year 1903. Among the European countries, Italy is the heaviest consumer of our bituminous, and was the only country to which any anthracite was shipped in 1904.

The exports to Canada, in detail, were:

	1903.	1904.
Anthracite	1,983,562	2,193,746
Bituminous	4,552,301	4,384,208
Totals	6,535,863	6,577,954

The increase in anthracite more than made up the shortage in bituminous coal.

The imports of coal for the two years stand as follows:

	1903.	1904.
Canada	1,613,426	1,211,304
Mexico	5	221
Great Britain	1,321,862	135,292
Other Europe	431	601
Australia	448,193	235,069
Japan	61,466	45,429
Other countries	1,019	759
Totals	3,446,402	1,628,675

Imports were all bituminous coal except for 72,526 tons of Welsh anthracite, which was less than half the imports of hard coal in 1903. The imports in 1904 were chiefly on the Pacific Coast. The Japanese coal is, nearly all, received at Manila.

Iron Trade Review.

NEW YORK, Feb. 8.

The iron markets are quiet for the present, and everybody seems to be taking a rest. So far, there is no anticipation of any serious falling off in business. The general belief is that orders for material have been placed for pretty well over the first half of the year, but there is no necessity for going further at present.

Pig iron requirements, so far as the foundry trade is concerned, seem to be pretty well filled. For bessemer iron, however, there is some demand, and the United States Steel Corporation has been negotiating for some further outside purchases, which will probably be made, if a compromise on prices can be arranged. The Corporation has now nearly all of its furnaces in blast, and is evidently providing for very large requirements in the way of steel.

In finished material the mills are generally full of orders, but not much new business is reported. The greatest activity seems to be in structural steel, and orders for some large quantities of bridge material are coming forward. The only material change in prices to be reported is an advance on wire nails and all wire products made by the American Steel & Wire Co. This latest advance puts prices back to very nearly the point where they were last year before the sensational cut in August was made.

Iron ore transactions are nearly closed for the season, and probably few or no large contracts are yet to be placed. Prices at Lake Erie ports, as noted last week, are somewhat higher than last season.

Birmingham. Feb. 6.

Alabama pig iron manufacturers admit that the market is steady and the demand strong. Prices show no change in the past week, No. 2 foundry being firm at $13.75@$14 per ton. The production during the past week was about the same, despite extremely inclement weather, making out-door work difficult. The furnace bins are well filled with raw material and if the extremely hard weather, which set in the last of the past week, keeps up for a week longer, the furnaces will be able to keep up in iron making. The shipments of iron were not so regular during the past week. The railroad authorities assert that some little trouble was experienced in getting cars loaded.

Iron is selling right along now for delivery during the second quarter of the year. A few sales have been made for delivery during the third quarter. Accumulated iron in the Birmingham district is rather scarce.

Two furnaces are being made ready to resume operations, one at Gadsden and one at Bessemer. A charcoal furnace at Gadsden will be blown in shortly. The two charcoal furnaces of the Shelby Iron Co. at Shelby, Ala., are still idle.

The production of basic iron in this district for sale is not very extensive. The five furnaces of the Tennessee Coal, Iron & Railroad Co. at Ensley make this class of iron for the steel plant adjacent, while the single furnace of the Alabama Steel & Wire Co. at Gadsden also produces basic iron to be used in the steel mill near-by.

The following quotations are given for pig iron: No. 1 foundry, $14@$14.25; No. 2 foundry, $13.75@$14; No. 3 foundry, $13 @$13.50; No. 4 foundry, $12.50@$12.75; gray forge, $12@$12.50; No. 1 soft, $14@ $14.25; No. 2 soft, $13.75@$14.

There is no change in the steel situation. The two steel plants in operation are doing excellently. Every ton of steel manufactured is finding a ready demand. The steel rail mill at Ensley, of the Tennessee Coal, Iron & Railroad Co., has orders on hand for its entire make for some time to come. The Alabama Steel & Wire Co. is pushing the work on an additional open-hearth furnace at its Gadsden plant.

In finished iron and steel there is no change. The rolling mills in this district are doing fairly well. At Bessemer steel is being worked exclusively, while the Birmingham and Gate City mills are handling iron. The mills at Sheffield and Anniston are giving employment to many men.

Rumors still prevail in regard to new steel plants in this district, the latest being that the Woodward Iron Co. may erect a plant near its furnaces in this district.

The Vulcan Machine & Foundry Co., capital stock $10,000, has been formed by George W. Hays and Edward Wingate, and the plant of the Wulburn Foundry & Machine Co., in Birmingham, has been purchased.

N. O. Nelson, of the Nelson Manufacturing Co., with pipe works in St. Louis, Mo., and Bessemer, Ala., was in the Birmingham district during the past week, and made full announcement of his plan for co-operation in the conduct of his plant at Bessemer and in dealing with consumers. He gives a certain amount of stock to his employees and to regular customers of the plant.

Chicago. Feb. 6.

Sales of iron, both pig and finished products, have been rather light in the last week. Inquiries, however, are full of promise and there is no weakening in prices. To judge from present indications, the market is not a strong one as regards sales, but the needs of the trade are such, and the general tone of the market firm enough, to justify the prophecy that there will not be a weakening for some time. Meanwhile, circumstances and developments may be such as to justify the hopes of the optimists in the trade.

It must be acknowledged that 1905 is not coming up to expectations; whether this is due to a lessened demand for iron, or to the opening of too many furnaces, is a problem for the statistician. The boom that began last October had its origin, to all appearances, in a reaction from the excessive caution that had prevailed over the presidential election. But such a boom in itself contained nothing of constancy; it indicated merely that the country was confident of the continuance of a national policy and the needs of the present could be safely contracted for. With the coming of a new year and with the hopes of legitimate trade based thereon, it was reasonably expected that there would be a large and constant demand for iron.

Sales in the last week have perhaps amounted to 15,000 tons, or not more than one-third of the volume in a week of late October or early November. Northern is firm at $17.50 and Southern at $13.50 Birmingham, or $17.15 Chicago, for con-

tracts under ordinary conditions. An effort is being made to make Southern higher priced and as much as $14 Birmingham is being obtained on some contracts. The selling is for the second and third quarters of 1905 chiefly; in a few cases deliveries will be made in the fourth quarter. Deliveries are now slow on account of transportation difficulties, but there is no general difficulty in this respect.

Coke is somewhat easier, the demand being lighter and supplies greater. Connellsville 72-hour is quoted at $5.65. The prospects for coke are not good and shipments should be restricted.

Cleveland. Feb. 7.

Iron Ore.—Buyers have about covered their needs for this year, and the market is experiencing a lull. The only change which may be expected in future will be the extension of the field of operation of the smaller producers. Prices have held about steady at $3.75 for bessemer old range; $3.50 for bessemer Mesabi; $3.25 for non-bessemer old range and $3 for non-bessemer Mesabi, all f.o.b. Lake Erie ports. The only change in the lake rate situation is the alliance of the masters and pilots and the longshoremen in an effort to break down the resolution of the vessel-owners for an open shop in lake labor circles. This is likely to result in a struggle.

Pig Iron.—The buying of foundry iron for spot shipment is limited, both by the needs of the foundries and also by the available supply. There is more of a disposition to buy material for second quarter delivery, although inquiries are bringing out the fact that a good many of the furnaces are already well sold up and have not a great deal of material of which to dispose. There has been no change in prices, although the better inquiry has strengthened the market. This was also affected by the appearance of some consumers trying to buy into the third quarter and the second half. The quotation holds at $16 in the Valleys for No. 2. Bessemer iron is steady at $16@$16.50 in the Valleys on light sales.

New York. Feb. 8.

Pig Iron.—Business has been rather quiet, so far as actual sales have been concerned, but there has been a good deal of inquiry. The Southern furnaces are reported to be less firm in their ideas, and business has been taken on a basis of $13.50 Birmingham for No. 2 foundry.

For Northern iron, large lots, New York delivery, there is no material change, and we quote as follows: No. 1 X foundry, $17.75; No. 2 X, $17.50; No. 2 plain, $16.75; gray forge, $16.50. There has been some demand for malelable bessemer, and an order was recently placed on a basis of $15.75 at furnace. Southern iron is reported weaker, but no material change in price can be given on actual sales. We continue to quote for large lots on dock: No. 1 foundry, $17.75; No. 2, $17.25@$17.50; No. 3, $16.75; No. 4, $16.25; No. 1 soft, $17.75; No. 2 soft, $17.25; gray forge, $16.25.

Business in pig iron warrants on the Produce Exchange has been very light, and excites little interest. Prices hav been weak, ranging around $16.05 bid and $16.30 asked, for March to July deliveries.

Bars.—Bars continue unchanged, quotations for large lots being 1.645@1.745c. for both iron and steel bars. Store trade is good, and prices run about 2c. for ordinary lots.

Plates.—Plates are in better demand, and are selling quite freely for forward delivery. Tank plates are quoted at 1.645@1.745c., New York delivery; boiler plates, 1.745@1.845c. Extra charge is made for extra widths.

Structural Material.—A good deal of new business is under negotiation, and some large Eastern orders for bridges are reported. The New York, New Haven & Hartford Co. has placed one contract for 2,000 tons of material with the American Bridge Co. Beams and channels up to 15 in. are quoted at 1.645c. for large lots, and over 15 in. 1.745c. Angles are 1.645c. for large orders.

Steel Rails.—The regular quotations continues $28 per ton at mill for standard sections. Very little business is done in this market. Light rails continue in good demand, prices varying from $23 for 35-lb. sections, up to $28 for 12-lb. rails.

Scrap.—The market remains quiet, with few important sales. There have been some exchange transactions, in which steel scrap was given for pig iron, but it is impossible to quote on these trades. No. 1 railroad wrought is quoted around $20, machinery cast, $14@$15; heavy steel melting scrap is selling around $16.50. These prices are for large lots, f. o. b. terminal points. Scrap delivered brings about $1.50 per ton more.

Pittsburg. Feb. 7.

The lull in the placing of new contracts for finished steel products is not taken as an indication that the market is weakening and no uneasiness is expressed. Mills have been afforded an opportunity to fill part of the heavy orders booked before the holidays, and if no new business is placed, will be kept busy for several months. The Carnegie Steel Co. is crowded with orders and is operating every available plant to full capacity. Last night it started six of the 12 open-hearth furnaces at the Donora steel plant. This plant was completed last year, but has never been operated. It became the property of the United States Steel Corporation when the Union-Sharon Steel Co. was absorbed and was put under control of the Carnegie Co. The company also got the two large modern blast furnaces at Donora. One was started eanly last month, and the other will be put in blast to-morrow. The Carnegie Co. will start the blast furnace at North Sharon Thursday, and at the end of the week will have but two idle furnaces, one of the Isabella group and the other at Zanesville, O. The latter has not been operated for a long time, and may not be put in blast again. Isabella furnace will be started when repairs are completed. Despite the fact that the Carnegie Co. is receiving the output of more than 50 blast furnaces, it is not able to produce its requirements of pig iron, and last month the Corporation was forced to buy 25,000 tons. Negotiations are now pending for a duplication of the order for shipment during February. The Steel Corporation objects to paying more than $15.50 a ton at the furnace for bessemer pig iron and the Bessemer Pig Iron Association insists on the minimum price of $16, established early in the year. The matter was finally closed by the purchase of 25,000 tons of bessemer iron from W. P. Snyder & Co., and 15,000 tons from the Bessemer Association, at $15.50 in the valleys.

The Lackawanna Steel Co. has started its ideal furnaces, and, with the bessemer iron purchased during the past two weeks, will have all the iron it will require for the rest of this quarter. It was reported here to-day, but the report was not confirmed, that southern foundry No. 2 has dropped to $13.50, Birmingham. This would make the price delivered in Pittsburg $17.85. Southern foundry iron for months has ruled at $1 or more a ton above the product of the Pittsburg or Valley furnaces.

While the iron and steel markets have been unusually quiet during the week as to new business, a decided revival in activity is expected before the end of the month. The advance in wire which has been looked for since the opening of the year, has at last been ordered and became effective on the first of the month. It is $1 a ton, making the new prices on wire bers, base, f. o. b. Pittsburg: Plain wire, 1.65c.; painted barb wire, 1.95c.; galvanized barb wire, 2.25c., and wire nails, $1.80 a keg. This is the third advance since the heavy cut made by the American Steel & Wire Co. last August, after the announcement of the conversion deal of the Pittsburg Steel Co. and the Republic Iron & Steel Co. The cut made then was $4 a ton on nails; $5 on plain wire, and $7 on galvanized wire. The advances since that time have been: November 16, $2 a ton; December 8, $1 a ton and February 1, $1 a ton. Nails are now at the same price as before the August cut, plain wire is $1 lower and barb wire $3 lower. The demand for wire is very good. Merchant pipe has been advanced $1 a ton during the week, the second advance made this year, prices now being $2 a ton higher than at the opening of the year. It is likely that 1905 will be a record-breaker, as several large projects contemplated for last year were deferred and are expected to be carried out this year in addition to several new projects now being figured upon. The weekly reports of mill operations received yesterday at the offices of the American Sheet & Tin-Plate Co., show that every tin-plate and sheet mill is running. The report last week that the company is storing large quantities of tin-plate in anticipation of trouble with the Amalgamated Association of Iron, Steel & Tin Workers, over the new wage scale is denied. It is explained that tin-plate was put in some of the warehouses, owing to the lack of transportation facilities, and it is strongly intimated that another advance in prices may be ordered before the end of the quarter.

Pig Iron.—Outside of a few small transactions, the pig iron market is very quiet. It is probable that the United States Steel Corporation will buy about 25,000 tons of bessemer iron for the Carnegie Steel Co. for February delivery. Bessemer is firm at $15.50@$16, Valley furnace, but foundry and forge iron are lower. No. 2 foundry is quoted this week at $16.85@$17.10, Pittsburg, and gray forge at $16.10@$16.25, Pittsburg.

Steel.—The steel market shows but little change from a week ago. For bessemer and open-hearth billets premiums of from $2 to $3 over the pool price of $21 are still asked. The plate and bar mills are all busy on old contracts, but little new business having been received lately. Plates are firm at 1.50c. and merchant steel bars at 1.40c.

Sheets.—The sheet mills are busy on old orders, and it is said the leading interest has sold within 25% of its capacity for the entire first half. Prices are very firm, No. 28 gauge black sheets being quoted at 2.30c. and galvanized at 3.35c.

Ferro-Manganese.—The market is strong and 80% domestic is now quoted at $46 a ton.

Cartagena, Spain. Jan. 21.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that exports for the week were two cargoes, 5,100 tons dry ore, one cargo, 2,850 tons magnetic ore, and one cargo, 3,900 tons manganiferous ore, all to Great Britain; one cargo, 1,500 tons manganiferous ore, to Marseilles, and one cargo, 3,900 tons magnetic ore, to Rotterdam. Business is very active, and contracts are being booked at somewhat higher prices. Freight rates continue unchanged, some quoted being 5s. 3d. to Jarrow, and 7s. to Rotterdam.

Quotations were as follows, f.o.b. shipping port: Ordinary 50% ore, 6s. 6d.@6s. 9d.; low phosphorus, 7s. 2d.@7s. 9d.; specular ore, 50%, 9s. 5d. For manganiferous ores quotations vary from 10s. 2d. for 35% iron and 12% manganese, to 14s. 9d. for 20% iron and 20% manganese.

Pyrite.—Iron pyrite, 40% iron and 43% sulphur, is quoted at 10s. per ton. No shipments reported for the week.

Chemicals and Minerals.

New York, Feb. 8.

With few exceptions the market is quiet, and prices unchanged. There is some speculation as to the future situation of raw materials, as the renewal of the sulphur and nitrate of soda combinations are now being considered. Expectation is that these agreements will be signed for another term of five years, and the placing of contracts for future delivery at high prices suggests the policy that will be continued by both combinations.

A dividend of 3.5% has just been declared by the Merrimac Chemical Co., of Boston, payable March 1.

Copper Sulphate.—Trade continues uninteresting, and makers quote $5.125@$5.25 per 100 pounds.

Acids.—Deliveries of sulphuric acid show some improvement. Other acids are quiet at firm prices.

Nitric acid, 36°, 100 lb.	$5.00
38°, 100 lb.	5.25
40°, 100 lb.	5.50
42°, 100 lb.	5.75
Oxalic acid, com'l, 100 lb.	5.00@ 5.25
Sulphuric acid, 50°, bulk, ton	13.50@14.50
60°, 100 lb. in carboys	1.05
60°, bulk ton	18.00@20.00
66°, 100 lb. in carboys	1.20
66°, bulk ton	21.00@23.00

Sulphur and Pyrite.—Quiet rules in the sulphur market, but pyrite shows further contracting for future delivery on basis of current quotations. Freights on pyrite from Huelva, Spain, to Atlantic ports are about 9s. ($2.16) per ton, which is equivalent to about 4.6c. per unit of sulphur contained in the ore. Sicilian brimstone, best unmixed seconds, is nominal at $21.25@$21.50 per ton; domestic, $21.45 at New York. Prime domestic, guaranteed 99.5%, stands at $21.75 at New York. Deliveries to Baltimore and Philadelphia cost 25c. per ton extra, and to Portland, Me., 15c. Imported pyrite, 44@52% sulphur, is quoted at 10@11.5c. per unit (about $5.16 per ton) for unwashed lump ore, and 9@10c. per unit ($4.56 per ton) for fines, f.o.b. Atlantic ports. Domestic lump ore, 42@44% sulphur, is worth 10@10.5c. per unit (about $4.42 per ton), and fines, 8.5@10c. per unit ($4.19 per ton), f.o.b. shipping port.

Exports of brimstone from Sicily for the full year 1904 amounted to 475,745 long tons, as against 475,508 tons in 1903. Compared to 1903, exports were, in long tons:

	1903.	1904.
France	74,372	103,042
Italy	45,572	79,619
United States	155,996	100,680
Other countries	199,568	192,404
Total	475,508	475,745

It is worthy of note that the increase in exports to France and Italy—62,717 tons together—more than makes up for the decrease of 55,316 tons in shipments to the United States.

Stocks at shipping ports in Sicily on December 31, 1904, amounted to 396,541 tons, as against 361,220 tons in 1903, and 339,113 tons in 1902.

Nitrate of Soda.—There is a quiet demand for immediate delivery of 96% quality at $2.35 per 100 lb., and for future shipment at $2.30. For 95% quality, prices are about 2.5c. per 100 lb. lower.

Sulphate of Ammonia.—Importers learn that the foreign market has again strengthened, speculatively it seems, for the future demand from the Continent and the United States is expected to be smaller. Talk of the interruption in production by German by-product coke ovens, owing to the coal miners' strike can have only a temporary effect. At New York foreign gas liquor ammonia is quoted at $3.225@$3.275 per 100 lb. for spot, and $3.275@$3.325 for futures. Domestic which is pretty well contracted for stands at $3.175@$3.225, according to time of delivery.

Phosphates.—There are signs of improvement, and the expectation that the German superphosphate manufacturers will agree to rehabilitate their market has given hope to American exporters for higher prices on phosphates. Completed statistics, varying little from the estimates given in the JOURNAL for January 5, give the water shipments of phosphates from Florida in 1904 as follows, in long tons:

	Domestic.	Export.	Total.
Hard-rock	6,807	483,359	490,166
Land pebble	133,002	219,520	352,522
Peace river	81,650	.....	81,650
Total	221,459	702,879	924,338
Total, 1903	226,154	617,981	844,135

The increase of 80,203 tons last year was distributed as follows: High-grade rock, 22,294 tons; land pebble, 41,914 tons, and Peace river pebble, 15,995 tons. Most of the domestic shipments were made to New Jersey and Maryland; those to foreign parts, principally to Germany, France and Italy. It is noteworthy that of the 924,338 tons shipped in 1904 there were exported 76%, which is a larger proportion than in 1903.

The shipments of Tennessee rock through Pensacola, Fla., last year are reported at 121,965 tons, chiefly to Italy and France, which is somewhat less than 1903.

Attention has been attracted to the Tunis phosphate mines by the public sale on December 21 last of the Aïn-Moulares deposit to a syndicate at 1.52fr. (29.3c.) per ton royalty on an annual output of 250,000 tons for a term of 50 years. This price compares with 1.77fr. (34.2c.) per ton paid by the present owners of the Kalaat-Es-Eenam property. It is said that the Aïn-Moulares deposit contains fully 12,000,000 tons of phosphate, that will carry from 63 to 67% B.P.L. The contention is made that the price to be paid is considerably less than had been offered the government of Tunis, and some trouble is expected to occur as the Compagnie des Phosphates et du Chemin de Fer de Gafsa, had signified its intention to work the new deposit by right of prior option.

Another interesting item is that the Gafsa Co. has discovered on its Djebel-Redeyef property phosphate that will analyze over 63%, and only 11% carbonate of lime. To develop this deposit a 20-mile spur on the Gafsa railway to Sfax is necessary. Shipments from Sfax in recent years have grown remarkably, and by far exceed those from the Algerian mines.

Phosphates are quoted as follows, per ton:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla., hard rock	$7.25@7.50	$11.45@11.65
land pebble	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%	4.00@4.25	10.27@10.67
78%	3.75@4.00	.....
75%	3.25@3.50	.....
‡So. Car. land rock	3.25@3.50	.....
river rock	3.00@3.25	6.38@ 6.67
Algerian, 63@70%	.....	7.04@ 7.71
58@63%	.....	6.15@ 6.60
Tunis (Gafsa)	.....	6.00@ 6.60
Christmas Isle	.....	13.28@14.11
Ocean Isle	.....	13.60@14.45
Somme, Fr	.....	11.39

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡ On vessel Ashley River, S. C.

Liverpool. Jan. 24.

Messrs. Joseph P. Brunner & Co. write that the ordinary lines of heavy chemicals are without change, while the position of fertilizers has improved.

Soda ash is well controlled by makers. For tierces, the nearest range is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s., net cash. Bags, 5s. per ton under price for tierces. Soda crystals are in moderate request, at generally £3 7s. 6d. per ton, less 5%, for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is in moderate supply and firm, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net, cash. Special terms for the Continent and a few other export quarters.

Bleaching powder is moving off freely for home consumption, but there is little doing for export, and for hardwood £4 15s. @£5 per ton, net cash, is the nominal range, as to market.

Chlorate of potash is inactive but steady, at 3 1-16@3 3-16d. per lb., net cash, as to quantity and market.

Bicarbonate of soda is in steady request, at £6 15s. per ton, less 2½%, for the finest quality, in 1-cwt. kegs, with usual allowances for larger packages; also special terms for a few favored markets.

Sulphate of ammonia is much firmer, stocks being light, while the coal strike in Germany has also had an effect on the market, and holders now quote £13 6s. 3d. @£13 8s. 9d. per ton, less 2½%, for good gray, 24@25%, in double bags, f. o. b. here.

Nitrate of soda is dearer, stocks, both here and on the Continent, being smaller than anticipated. Quotations on spot have advanced to £11 10s. per ton, for ordinary, up to £11 15s. per ton for refined, packed in double bags, f. o. b. here, less 2½ per cent.

Metal Market.

New York, Feb. 8.

Gold and Silver Exports and Imports.

At all United States Ports in December and year.

Metal.	December.		Year.	
G'ld	1903.	1904.	1903.	1904.
Exp	$1,464,656	$13,429,415	$44,346,834	$121,138,415
Imp	17,230,298	3,336,184	65,267,696	84,803,234
Exc	I.$15,765,642	I.$10,093,231	I.$20,920,862	E$36,335,181
Silv				
Exp	6,515,653	4,292,161	40,610,342	50,312,745
Imp	2,078,655	2,252,955	23,974,508	26,087,042
Exc	E.$4,436,998	E. $2,039,206	E$16,635,834	E$24,225,703

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending February 4 and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$11,336,423	$214,149	$838,045	$ 5,763
1905.	23,897,883	349,885	3,480,103	78,668
1904.	809,162	1,194,272	4,991,974	103,637
1903.	26,303	623,172	1,764,379	118,304

Gold exports continue, and there is no present sign of their cessation. Since the present movement began, about the end of last October, the total amount of gold sent abroad has been $63,500,000. Of this $12,250,000 went to Cuba, on account of the loan made by that country; and $8,000,000 went to Argentina, chiefly on London orders. Most of the rest went to France.

The statement of the New York banks—including the 53 banks represented in the Clearing House—for the week ending February 5, gives the following totals, comparisons being made with the corresponding week of 1904:

	1904.	1905.
Loans and discounts	$998,850,800	$1,128,086,800
Deposits	1,027,156,500	1,196,980,300
Circulation	41,509,400	42,898,700
Specie	205,966,900	227,313,500
Legal tenders	72,665,000	91,773,500
Total reserve.	$278,631,900	$319,087,00
Legal requirements.	256,789,125	299,245,075
Balance surplus.	$21,842,775	$19,841,920

Changes for the week were increases of $12,443,600 in loans and discounts, $7,151,700 in deposits, and $16,500 in circulation; decreases of $4,211,700 in specie, $1,138,000 in legal tender, and $7,137,625 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars:

	Gold.	Silver.
N. Y. Ass'd.	$227,313,500	.....
England	177,554,150	.....
France	540,141,300	$220,102,250
Germany	200,385,000	66,795,000
Spain	74,610,000	100,985,000
Netherlands	29,189,500	31,325,500
Belgium	15,766,665	7,883,335
Italy	112,340,000	15,966,500
Russia	502,885,000	28,660,000
Austria	242,005,000	62,685,000

The returns of the Associated Banks of New York are of date February 4, and the others February 2, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Silver is steady to firm. While no new features are indicated, demand for India for up-country distribution continues good and a small advance in price is not impossible.

The United States Assay Office in New York reports receipts at 113,000 oz. of silver during the week.

Shipments of silver from London to the East for the year up to January 17 are reported by Messrs. Pixley & Abell's circular as follows:

	1904.	1905.	Changes.
India	£1,367,489	510,000	D. £857,489
Straits	38,103	2,800	D. 35,303
Totals	£1,405,592	£512,800	D. £892,792

Receipts for the week were £160,000 in bar silver from New York, £7,000 from the West Indies, and £4,000 from Australia; total, £171,000. Shipments were £143,800 in bar silver to Bombay and £11,700 to Calcutta; total, £155,500.

Indian exchange continues strong, and the full amount of Council bills offered in London was taken at an average of 16.06d. per rupee. The demand for money in India continues strong. Buying of silver for Indian account has improved.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.47½	$0.49½
Peruvian soles and Chilean pesos	.43½	.46
Victoria soverigns	4.85½	4.87
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	.82

Other Metals.

Daily Prices of Metals in New York.

	Copper.			Tin.	Lead.	Spelter	
February.	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.	Cts. per lb.	Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
2	15¼ @15¼	15 @15⅛	67¼	29½	4.45	6.15	6.00
3	15¼ @15¼	15 @15⅛	67½	29½	4.45	6.15	6.00
4	15¼ @15½	15 @15⅛	....	29½	4.45	6.15	6.00
6	15 @15¼	14⅞ @15⅛	67½	29⅜	4.45	6.15	6.00
7	15 @15¼	14⅞ @15⅛	67½	29⅜	4.45	6.15	6.00
8	15 @15¼	14⅞ @15⅛	67⅜	29½	4.45	6.15	6.00

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

SILVER AND STERLING EXCHANGE.

		Silver.				Silver.	
February.	Sterling Exchange.	New York, Cents.	London, Pence.	February.	Sterling Exchange.	New York, Cents.	London, Pence.
2	4.88	61½	28⅛	6	4.88	61½	28⅛
3	4.88	61½	28⅛	7	4.88	61½	28⅛
4	4.88	61⅜	28⅛	8	4.87¼	61½	28⅛

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine.

Copper.—The market during the past week has been extremely quiet. Owing to the unsettled conditions abroad, and particularly the strike in Germany, the demand for export has been rather slack, but prices have not been affected very much, as first hands have had very little copper for sale. Indications point to a much more active market in the near future. We quote at the close 15@15¼ for Lake copper; 14⅞@15⅛ for electrolytic in ingots, cakes and wirebars, 14⅝@14⅞ in cathodes; 14½@14¾ for casting copper.

The market for standard copper in London, has been somewhat influenced by the adverse conditions mentioned above, and the closing quotations on Wednesday are cabled as £67 7s. 6d. for spot; £67 10s. for three months.

Refined and manufactured sorts we quote: English tough, £70@£70 10s.; best selected, £70 15s.@£71 5s.; strong sheets, £78 10s.@£79 10s.; India sheets, £75 10s.@£76 10s.; yellow metal, 6⅝@6¾d.

Exports of copper from New York and Baltimore for the week ending February 7, were 2,387 long tons. Imports for the week of February 3 were 74 tons.

Tin.—The demand continues at a very fair rate. Spot metal is still at a premium, however, not so pronounced as last week, as the supplies are somewhat more plentiful owing to a fair amount of arrivals. The quotations at the close are 29½ for spot, 29c. for futures.

The foreign market, which closed last week at £132 for spot £130 15s. for three months, opened on Monday somewhat easier at £130 10s. for spot, but since then there has been a recovery, and the closing quotations on Wednesday are cabled as £131 10s. for spot, £130 for three months.

Lead.—As usual at this time of the year, the demand is not very heavy, but quotations are unchanged at 4.37½ St. Louis, 4.45c. New York.

The foreign market has been slightly easier and closes at £12 11s. 3d. for Spanish lead, £12 13s. 9d. for English lead.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is quiet but steady, 4.35c. being asked for ordinary Missouri brands, and 4.37½c. for desilverized lead.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Jan. 21, that silver has been 14.50 reales per oz. Current exchange is 33.09 pesetas to £1. Lead has been 70.50 reales per quintal, which, on current exchange, is equal to £11 18s. 6d. per long ton, f. o. b. Cartagena. Exports have been 709 tons desilverized to Great Britain, 130 tons desilverized to Marseilles, and 10 tons lead ore to Liverpool.

Spelter.—The cold weather which has again set in in the Joplin district, has checked a further decline, and since our last report, the market has been steady, both for ore and spelter. The closing quotations are 6.15 New York, 6c. St. Louis.

The foreign market is unchanged at £24 12s. 6d. for good ordinaries, £24 15s. for specials.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is rather easier. The metal seems to have sellers at 6c., but not many buyers.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Jan. 21, that the demand for ores continues steady. Quotations are unchanged at 75 fr. per ton for blende, 35% zinc, and 54 fr. for calamine, 30% zinc. Exports were 2,150 tons blende to Antwerp.

Antimony is unchanged. We quote: Cookson's 8¼@8½; Hallett's, 8@8¼; Hungarian, U. S., French, Japanese, Italian and Chinese, 8@8⅛.

Nickel.—Producers quote 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots is higher, according to quantity, running up to 60c. for small orders.

Platinum.—Quotations are firm at $19.50 per ounce.

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 74c.; crucibles and dishes, 78c.; perforated ware, 85c., and cones, $1 per gram.

Imports of platinum into the United States for the full year were 7,852 lb. in 1903, and 7,111 lb. in 1904, showing a decrease of 741 lb. last year.

Quicksilver.—Quicksilver continues quiet but steady, at $40 per flask in large lots, while $41.50 is the price for smaller orders. San Francisco prices are low $39@$40 per flask being quoted for domestic orders, with some discount for export. The London price is lower, at £7

12s. 6d., with the same figures quoted by second hands.

Cadmium.—Metallic cadmium, guaranteed 99.5%, is selling in quantities of 100 kg. or over at 710 marks per 100 kg., packing included, f.o.b. Hamburg. This is equivalent to 76.6c. per lb. Prices are for net cash.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted at 360 marks per 100 kg. f.o.b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality, and 225 marks for second quality, both f.o.b. Bremen.

For other minor metals and their alloys, wholesale prices are f.o.b. works:

	Per lb.
Aluminum.	
No. 1, 99% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	$1.00
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	45c.
Magnesium, pure (N. Y.)	$1.60
Manganese, (98@99% N. Y.)	75c.
Manganese Cu., (30@70% N. Y.)	40c.
Molybdenum, (98@99% N. Y.)	$2.75
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best)	$1.25

Missouri Ore Market.

JOPLIN, Feb. 4.

Zinc ore was $2 per ton lower, the highest price reported being $58 per ton against $60 the previous week, while the assay basis was $52@$54 per ton of 60% zinc. With the district still enveloped in a climatic condition worthy a latitude many miles further north, the mercury in the thermometer hugging close the zero line, the earth blanketed with a half-foot of snow, small mines closed down and many large ones operated only part of the time, the purchasing agents have undertaken to secure their ore supply at a lower rate. Not only because the price had reached a pinnacle fully $12 above its worth, compared with the metal market, allowing no margin of profit between, but also on account of the severe cold, clogging the ore with ice and snow, have the companies decided to take no more than is absolutely needed to carry them through this unusually rough wintery weather. If there is any possible hope of spelter being edged up toward a 7c. market, a break in the winter may set again in motion the same activity that sent the price up to $60 per ton in January. With no reserve stock and the smelters drawing a limited supply just now, there will be ample room for further spirited competition. The lead output is also light and the price is quoted at $57 per ton. Following are sales for the week:

	Zinc, lb.	Lead, lb.	Value.
C't'rville-Webb City	1,637,610	467,490	$57,540
Joplin	1,536,250	94,350	46,460
Duenweg	600,200	.....	16,810
Aurora	508,620	15,800	12,250
Galena-Empire	426,120	.....	11,850
Carthage	406,950	.....	11,390
Oronogo	377,640	.....	9,730
Badger	259,690	.....	7,530
Prosperity	128,310	128,330	7,250
Alba	207,860	.....	5,820
Neck City	128,900	.....	3,610
Baxter Springs	123,170	.....	3,680
Granby	125,000	32,000	2,360
Sherwood	42,800	.....	1,200
Stott City	36,170	.....	940
Diamond	30,530	.....	820
Totals	6,575,820	750,860	$199,240
Five weeks	37,003,380	4,313,570	$1,089,670

Zinc value, the week, $177,855; five weeks, $960,720.
Lead value, the week, 21,385; five weeks, 128,950.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.055	60.690	26.423	27.930
February	57.592	.....	26.665	.....
March	56.741	.....	26.164	.....
April	54.202	.....	24.974	.....
May	55.430	.....	25.578	.....
June	55.673	.....	25.644	.....
July	58.095	.....	26.760	.....
August	57.806	.....	26.591	.....
September	57.120	.....	26.349	.....
October	57.923	.....	26.760	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

COPPER IN NEW YORK.

Month.	Electrolytic.		Lake.	
	1904.	1905.	1904.	1905.
January	12.410	15.008	12.553	15.128
February	12.063	.....	12.245	.....
March	12.299	.....	12.551	.....
April	12.923	.....	13.120	.....
May	12.758	.....	13.000	.....
June	12.269	.....	12.399	.....
July	12.380	.....	12.505	.....
August	12.343	.....	12.468	.....
September	12.495	.....	12.620	.....
October	12.993	.....	13.118	.....
November	14.284	.....	14.456	.....
December	14.661	.....	14.849	.....
Year	12.823	.....	12.990	.....

Prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars; cathodes are usually 0.25c lower.

COPPER IN LONDON.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	57.500	68.262	July.	57.256	.....
Feb.	56.500	.....	August	56.952	.....
March	57.321	.....	Sept.	57.645	.....
April	58.247	.....	Oct.	60.012	.....
May	57.321	.....	Nov.	65.085	.....
June	56.398	.....	Dec.	66.384	.....
			Av., year	58.857	.....

Prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905
Jan.	28.845	29.325	July.	26.573	.....
Feb.	28.087	.....	August	27.012	.....
March	28.317	.....	Sept.	27.780	.....
April	28.132	.....	Oct.	28.596	.....
May	27.718	.....	Nov.	29.185	.....
June	26.325	.....	Dec.	29.286	.....
			Av., year	27.986	.....

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July.	4.192	.....
Feb.	4.375	.....	August	4.111	.....
March	4.475	.....	Sept.	4.200	.....
April	4.475	.....	Oct.	4.200	.....
May	4. 23	.....	Nov.	4.200	.....
June	4.496	.....	Dec.	4.600	.....
			Av., year	4.309	.....

SPELTER.

Month.	New York.		St. Louis.	
	1904.	1905.	1904.	1905.
January	4.863	6.190	4.673	6.032
February	4.916	.....	4.717	.....
March	5.057	.....	4.841	.....
April	5.219	.....	5.038	.....
May	5.031	.....	4.853	.....
June	4.760	.....	4.596	.....
July	4.873	.....	4.723	.....
August	4.866	.....	4.716	.....
September	5.046	.....	4.896	.....
October	5.181	.....	5.033	.....
November	5.513	.....	5.363	.....
December	5.872	.....	5.720	.....
Year	5.100	.....	4.931	.....

Dividends.

Company.	Payable.	Rate.	Amount.
†Amalgamated Copper	Feb. 27	.50	765,439
Amalgamated, extra	Feb. 27	.50	765,439
‡Associated Oil, Cal.	Feb. 1	.01½	315,000
Atlantic Copper	Feb. 15	.50	50,000
*Bunker Hill & Sull.	Feb. 4	.25	75,000
Cambria Steel	Feb. 15	.75	675,000
†Camp Bird, Col.	Feb. 4	.18	147,600
*Caribou Oil, Cal	Feb. 16	.07	5,600
*Central Eureka, Cal	Feb. 11	.07	28,000
*Central Lead, Mo	Feb. 28	.50	5,000
Claremont Oil, Cal	Feb. 1	.01	4,500
†Colo. & Hocking C. & I.	Feb. 15	.25	17,311
Esperanza, Mex	Feb. 11	.12	54,600
*Four Oil, Cal	Feb. 15	.01	3,000
Gold King Con., Colo.	Feb. 15	.01	9,369
Greene Con. Copper	Feb. 20	.40	345,600
*Imperial Oil, Cal.	Feb. 6	.20	20,000
Jeff. & Clearf., c., pf.	Feb. 15	2.50	37,500
*Lightner, Cal.	Feb. 20	.05	5,113
†National Carbon, pf	Feb. 15	1.75	78,750
*New Century Zinc & Lead	Feb. 1	.01	1,500
*Oil City Petroleum, Cal.	Feb. 1	00½	2,500
*Peerless Oil, Cal.	Feb. 1	.14	12,880
*Penna. Con., Cal.	Feb. 15	.10	5,150
*Peñoles, Mex.	Feb. 15	23.75	59,375
†Phila. Gas, com.	Feb. 1	.75	398,888
Phila. Gas, pf	Mar. 1	1.25	143,620
*Pocahontas Coll., pf	Feb 1	.50	7,500
Quincy, Mich	Feb. 26	3.00	300,000
*Silver King, Utah.	Feb. 10	.66⅔	100,000
†Tenn. C. & I., pf.	Feb. 1	2.00	4,960
*Thirty-three Oil	Feb. 6	.10	10,000
*Twenty-eight Oil, Cal.	Feb. 1	.15	9,000
†U. S. Steel, pf	Feb. 28	1.75	6,304,919
*Union Oil, Cal.	Feb. 15	.50	26,336
United States, Utah.	Feb. 15	.50	210,000

*Monthly. †Quarterly. ‡Semi-Annual.

Assessments.

Company.	Delinq.	Sale.	Amt.
Andes, Nev.	Jan. 26	Feb. 17	$0.10
Big Casino, Cal.	Feb. 18	.....	.03
Bunker Hill, Cal.	Mar. 1	.....	.05
Burlington, Utah.	Feb. 15	Mar. 15	.00½
Caledonia, Nev.	Feb. 15	Mar. 8	.10
Columbus Con., Utah.	Feb. 11	Mar. 6	.20
Con. Cal. & Va., Nev.	Feb. 7	Feb. 28	.25
Dagmar Northwest, Utah.	Feb. 15	Mar. 10	.00½
Elsie, Utah	Jan. 2	Feb. 12	.04
Eureka Con. Drift, Cal.	Jan. 21	Feb. 13	.00½
Gold Run, Utah.	Jan. 24	Feb. 10	.00½
Gould & Curry, Nev.	Feb. 24	Mar. 15	.10
Hale & Norcross, Nev	Mar. 7	.....	.10
Hardscrabble, Utah.	Jan. 31	Feb. 28	.00½
Highland Boy Con., Utah.	Feb. 4	Feb. 23	.00½
Jenny Lind, Cal.	Feb. 13	.....	.01
Lower Mammoth, Utah	Jan. 21	Feb. 10	.05
Mayday, Cal	Jan. 24	Mar. 7	.03
Patterson Creek, Cal	Feb. 20	.....	.10
Petro, Utah.	Feb. 18	Mar. 11	.03
Planetary, Utah.	Jan. 23	Feb. 23	.01
Potosi, Nev.	Feb. 21	Mar. 15	.10
Quincy, Jr., Utah.	Jan. 26	Feb. 15	.10
Raft River, Utah	Jan. 11	Feb. 15	.00½
Seg. Belch. & Mides.	Feb. 7	Feb. 27	.05
Sheba, Utah	Feb. 15	Mar. 10	.03
Torbanehill, Utah.	Jan. 31	Feb. 20	.00½
Union, Con., Nev.	Feb. 24	Mar. 16	.15
West Century, Utah	Feb. 20	Mar. 10	.00½
Yellow Jacket, Nev.	Jan. 11	Feb. 16	.10

Salt Lake City.

Feb. 3

Company.	Par Val.	High.	Low.	Sales. Shares.
Ajax	$1	.10½	.10½	800
Beck-Tunnel		.06	.06	1,000
Butler-Liberal	1	.14½	.13½	8,300
Century		.10	.10	500
Columbus Con.		.80	.75	600
Daly-Judge	20	6.50	6.50	424
Daly-West	20	15.00	15.00	5
Ingot	¼	.03½	.02½	6,700
Little Chief	1	.02½	.02½	20,200
May Day	1	.09	.06	52,900
Mammoth	25	1.20	1.16½	1,500
Naildriver	1	.50	.50	251
N. Y. Bonanza	1	.49	.40	29,400
Petro	1	.07	.07	500
Silver Shield		.16	.07½	30,300
Star Consolidated	1	.15½	.15½	4,500
Swansea		.27½	.27½	200
Tetro	1	.23	.18½	19,400
Uncle Sam Consolidated	1	.20½	.22	2,250
Utah	1	.48	.47	500
Victoria	1	1.90	1.89	200
Victor Con	1	.04	.04	1,000
Wabash	1	1.95	1.75	600
Yankee Consolidated	1	.35½	.34½	3,300

Total sales 175,930 shares.

STOCK QUOTATIONS.

Colorado Springs (By Telegraph).

Company	Feb. 6		Feb. 7	
	H.	L.	H.	L.
Anaconda	.21½	.21	.21	.19½
C. K. & N.	.19½	.19½	.21½	.20
Cripple Ck. Con.	.12	.11½	.12	.11½
Doctor Jack Pot	.04	.03½	.03½	.03½
Elkton Con.	.71	.70½	.70½	.70½
El Paso	1.71	1.70½	1.70	1.69½
Isabella	.34½	.33½	.34½	.34
Moon Anchor	.08½	.08	.08½	.07½
Old Gold	.08½	.08		
Portland	1.87	1.85	1.90	1.85
Vindicator Con.	.85	.76	.90	.75
Work	.15½	.15½	.15½	.15

Ishpeming, Minn.*

Feb. 4.

Company.	Par Val.	H.	L.
Black Mountain	$1	$2.10	$2.05
Calumet & Arizona	10	109.00	108.00
Calumet & Pittsburg	10	50.00	45.50
Junction Development	15	100.00	94.00
Lake Superior & Pittsburg	10	52.25	52.00
Pittsburg & Duluth (full paid)	15	30.00	29.75

*By The Wallace H. Hopkins Co.

St. Louis, Mo.*

Company.	Par Val.	Bid.	Ask.
Am. Nettie, Colo.	$10	$0.15	$0.20
Center Creek	10	1.40	1.75
Central Coal & C.	100	61.50	63.00
Central C. & C., Pf.	100	72.00	74.00
Central Lead, Mo.	100	120.00	125.00
Columbia Lead Mo.	10	.25	1.90
Con. Coal, Ill	100	11.00	15.00
Doe Run Lead, Mo.	100	115.00	120.00
Granite Bimet., Mont.	10	.35	.40
St. Joe Lead, Mo.	10	16.00	17.50

*By our Special Correspondent.

Montreal.*

Company	Par Val.	High.	Low.	Sales.
Dominion Coal	100	61.25	61.00	465
Dominion Coal, Pf.	100	114.75		30
Dom. I. & St.	100	19.00	16.75	845
Dom. I. & St., Pf.	100	63.25	62.00	515
Montreal Steel	100	70.00		59
Montreal Steel, Pf	100	101.50	101.00	50
Nova Scotia St.	100	65.75	64.00	665
N. S. Steel, Pf.	100	110.00	109.75	25

*Montreal Stock Exchange.
Total sales, 2,654 shares.

San Francisco.*

Feb. 2

Company.	Location.	Opening.		Closing.		Sales.
		H.	L.	H.	L.	
MacNamara	Nev.	.45	.35	.68	.51	105,350
Mont. Tonopah	Nev.	2.10		2.40	2.35	11,890
Ton. Belmont	Nev.	.75	.72	.85	.84	16,000
Ton. Midway	Nev.	.59	.57	.91	.90	16,800
Ton. Mg. Co.	Nev.	.11½	.11½	.2½	.12	250
Ton. North Star	Nev.	.31	.29	.39	.38	21,800

*San Francisco & Tonopah Exchange.
Total sales, 172,090 shares.

San Francisco (By Telegraph).

Company.	February	
	6	7
Belcher	.25	.23
Best & Belcher	1.25	1.25
Caledonia	.65	.61
Challenge Con.	.30	.30
Chollar	.31	.29
Confidence	.95	.93
Con. California & Virginia	2.25	2.10
Crown Point	.19	.19
Gould & Curry	.24	.23
Hale & Norcross	1.55	1.50
Mexican	2.20	2.15
Ophir	8.00	7.50
Overman	.29	.28
Sierra Nevada	.45	.43
Union Con.	.66	.64
Yellow Jacket	.29	.27

New York.

Company.	Par Val.	Feb. 1		Feb. 2		Feb. 3		Feb. 4		Feb. 6		Feb. 7		Sales
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amalgamated	100	74½	73½	74½	73⅝	75½	74⅛	75	74½	74½	73⅛	74½	73½	155,650
Anaconda	25	108½	108	108	107	108½	108	108½	107½	107		106½	1.05	3,700
Best & Belcher	3													
Brunswick	1					.07				.08	.07			3,500
Bullion	1											32	30	500
Caledonia	1					.70		.68		.70				500
Chollar	2½									.28				300
Chrysolite	50			.06										100
Con. Cal. & Va.	2½					1.90	1.75					2.20	2.15	487
Elkton Con.	1			.73						.72				500
Federal Mining and Smelting	100					64½	63	67	64	68	66½			4,930
Preferred	100	78		79		81	79½	82½	81½	83	81			3,800
Gould & Curry	1	.21	.20											200
Greene Consolidated Copper	10	26⅞	26½	26⅜	26	26⅜	26⅛	26⅛	26½	26½	26½	26⅛	26⅛	14,300
Greene Consolidated Gold	10	7½	7⅛	7⅛	7⅛	7⅛	7⅛	7⅛	7	7⅛	7⅛	7⅛	7⅛	8,500
Hale & Norcross	3	1.30		1.30										300
Homestake	100											73		100
Horn Silver	20	1.65												100
Isabella	1							.35				35		700
Justice	2									.15				500
Leadville	10					.04								500
Little Chief	50			.05		.05								500
Mexican	3									2.30				100
Mollie Gibson	5			.06				.06	.05					900
Moulton	25			.26										200
Ontario	100											4.00		100
Ophir	3	6.50		6.50				7.25	7.00	8.00				700
Overman	2													
Phoenix	1			.11		.12				.12		11	10	3,000
Portland	1													
Potosi	1	.13				.12				.15		15		1,200
Quicksilver	100													
Quicksilver, pf.	100													
Savage	3	.35		.36								42		800
Sierra Nevada	3	.42												200
Silver Hill	1	.65								.65				400
Small Hopes	20													
Standard Con	10													
Tennessee Copper Common	25	33½				32						32		350
Union Consolidated	1					.62		.64	.63					600
United Copper	100													
Yellow Jacket	3					.29	.27	.30		.30	.29			1,000

Total sales, 209,211 shares.

Boston.

Company.	Par Val.	Feb. 1		Feb. 2		Feb. 3		Feb. 4		Feb. 6		Feb. 7		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Adventure Con	$25	7½	7	7		7		6½						660
Allouez	25	21	20½	20½	20	20½	20½			20½	19½	20	19½	1,902
Amalgamated	100	74½	73⅛	74⅛	73½	75½	74½	75	74⅛	74⅛	73½	74⅛	73⅛	23,238
Am. Z. L. & Sm.	25							11½						10
Anaconda	25													
Arcadian	25	1½				1½						1½		535
Arnold	25									.75		.75		150
Ash Bed	25													
Atlantic	25	17½	17	17½	17	‡17½	17	17½	17	17½	17			1,114
Bingham Con	50	32½	32½	32¾	32½	32¼	32½	33	32¾	33		32½		1,522
Bonanza	10									.70				200
Boston Con	5	6		7½	6½	7½	6½	6½		6¾	6½	7	6¾	7,200
Calumet & Hecla	25	680		680		680	675	677		680	675	675		148
Centennial	25	18½	18	18	17¾	18½	18	18		17½		18	17½	1,314
Con. Mercur	₩5	.38	.35	.38		.38		.37		.35				1,876
Continental Zinc	25													
Copper Range	100	69½	68	69	68½	69¾	68¾	69½	69	69	68½	69½	68½	6,313
Crescent	10													
Daly-West	20	15½	15	15½	15	15½	15½			15½	15	16	15½	1,325
Elm River	12			2¾										150
Franklin	25					11		11½		10½		10½		310
Granby Con	10	5⅜	5	5⅜	5⅛	5⅜	5⅛	5⅜	5	5⅛	5	5⅜	5	6,465
Greene Con	10	27	26½	26½	26	26⅜	26⅛	27	26⅜	26½	26½	26½	26½	4,494
Guanjuato Con	10	3¾		4⅛		4	3⅞			4	3¾	4	3¾	7,152
Humboldt	25					1¾				.90				300
Isle Royale Con	25	25½		25⅜	25½	26½	25⅜	25½	25	25½				915
Mass Con	25	10½		10⅜	10½	11	10⅜	10⅜	10½	10⅜	10⅜	12	10½	6,852
Mayflower	25											11½		10
Michigan	25	12½		13½	12½	13⅜	13⅜	13⅜	13⅛	13⅛	12½	12⅜	12⅜	3,245
Mohawk	25	53				53½	52½	53				52		341
Montana Coal & Coke	25	4		4⅛		4⅛		4⅛	4⅛	5	4⅛	4⅛		1,460
National	25													
New Idria	₩5													
Old Colony	25	1										1½	1½	215
Old Dominion	25	26½		26½	26½	27	26½	27	26½	27				635
Osceola	25	95		94½	93	94½	93½			94		93½	93	544
Parrot	10	28		28½	27½	28								300
Phoenix Con	25					3		3		3				190
Quincy	25	110		113	110	115	114			‡115	110			129
Rhode Island	25	2½				2½				2½	2½	2½		450
Santa Fe	10			2½						2½				220
Shannon	10	7⅛		8	7⅛	8	7⅛	7⅛	7⅛	7⅛	6⅝	7	6⅝	8,797
Tamarack	25	132½	131	133	131½	133	132	134½	134	135	134	134	132	473
Tecumseh	25	3½	3			3	2							3,450
Tennessee	25													
Trinity	25	13⅛	12½	13	11⅛	12½	11	11⅛	11	11⅛	11	11½	10½	66,607
Union Cop. L'd. & Mg.	25													
United States	25	22⅛	22½	22½	22⅛	‡24	22½	24	23½	23½	23⅛	23⅛		13,345
U. S. Coal & Oil	25	10½	10	10		10	9⅛	10½	10	10⅜	9⅛			1,540
Utah Con	5	42½	42	42⅛	41½	42½	42	42	41⅛	42	41½	41⅛	41⅛	3,395
Victoria	25	5		5		5	4⅞	5		5	4⅞	5	4⅞	970
Winona	25	12	11½	12	11⅛	12½		12		12	11½	12	11½	645
Wolverine	25	105		109	108	109	108½	109		109		112	110	830
Wyandot	25											2		175

‡ Assessment paid. Total sales, 222,111 shares.

STOCK QUOTATIONS.

Coal, Iron and Industrial Shares.

Company.	Par Val.	Feb. 1		Feb. 2		Feb. 3		Feb. 4		Feb. 6		Feb. 7		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allis-Chalmers	$100	....	....	15⅜	15¼	15¼	15⅛	15¼	....	15⅛	....	15½	15¼	1,500
Preferred	100	....	....	62	....	....	....	....	....	....	....	....	....	400
Am. Agri. Chem.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Preferred	100	....	....	....	....	89½	....	....	....	....	....	....	....	100
Am. Sm. & Ref.	100	85⅞	85½	86	85⅝	86½	86	86¼	86	86¼	85⅞	87½	86	42,165
Preferred	100	119	....	119	118¾	119⅝	118¾	118⅝	118¾	119	118¼	119⅝	118⅞	7,130
†Cambria Iron	50	49	....	49	....	49	....	49	....	....	....	48½	....	78
†Cambria Steel	50	....	....	25¼	....	26⅝	26½	....	....	25⅝	25½	25½	25½	789
Col. Fuel & Iron.	100	47⅛	46	47⅛	46¼	47¼	46½	47⅛	46¼	47½	46½	49¼	47¼	60,700
Col. Fuel & Iron pf	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Col. & H. C. & I	100	17¼	....	16⅛	....	....	....	....	....	....	....	16¼	16½	500
General Chem.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
General Chem. pf	100	102	....	....	....	....	....	....	....	....	....	....	....	100
†Lehigh C. & N.	50	108½	107½	109½	108	109	108½	109	108½	108¼	....	109½	108½	1,452
*Mong. R. Coal	100	....	....	....	....	....	....	....	....	....	....	10	....	50
*Mong. R. Coal pf.	100	....	....	....	....	28½	....	....	....	28½	....	28	....	930
National Lead	100	27¾	26⅞	28	27	29¼	28	21	29½	32	31	32¼	30¾	73,250
Preferred	100	101¾	101¼	101¼	101	104¾	103⅞	103¼	....	....	....	....	....	1,400
Phila. Nat. Gas	50	41⅛	40⅞	41⅞	41½	41⅞	41½	41⅝	....	41⅛	41¼	41⅞	41½	5,287
Preferred	50	47	....	47	....	....	....	47⅛	....	47	....	47⅛	47½	978
Pittsburg Coal	100	21¼	21	21¼	21	21¼	20½	21¼	20⅜	21¼	21	21⅛	....	5,111
Preferred	100	80	79½	79⅜	78½	78⅝	78	78½	78⅛	78⅛	78	78⅛	78½	4,171
Republic I. & S.	100	16½	16⅛	16¼	16	16¼	16⅛	16¼	....	16	....	16⅛	16	7,500
Preferred	100	69	....	68½	....	69	....	69	....	69	....	70⅛	69	5,125
Sloss Shef. S. & I.	100	....	....	61	....	....	....	60½	....	62	61½	63¼	61½	4 750
Preferred	100	....	....	....	....	....	....	....	....	102¼	....	....	....	50
Standard Oil.	100	642	640	645	641	653	645	656	651	652	650	649	....	263
Tenn. C. I. & R. R.	100	72¼	71½	72¼	71½	72¼	71⅞	73	71½	74⅜	72½	77¼	73⅜	67,900
U. S. Steel Corp	100	31	30	30½	30¼	30⅜	30½	30⅞	30¼	31	30⅜	31	30¼	166,250
Preferred	100	95⅛	94¼	95	94½	95¼	94⅜	95⅛	95¼	96	95⅜	96¼	94¼	236,997
Va.-Car. Chem	100	34½	34⅛	34⅜	34½	35¼	34½	35	....	35	34½	35	34¾	5,110
Preferred	100	107½	....	108	....	108	....	....	....	108¼	....	....	....	567

*Pittsburg Exchange; †Philadelphia Exchange; all others, New York Stock Exchange; Total sales, 700,603 shares.

Mexico.

Jan. 27.

Company.	Shares Issued.	Prices, Mex. Bid.	Prices, Mex. Ask.
DURANGO:			
Penoles	2,500	$2,600	$3,000
San Andres de la Sierra	200	10,000	.....
GUANAJUATO:			
Cinco Senores y An. aviadoras	2,000	12	18
Cinco, Senores y An. aviada	400	30	40
Providencia, San Juan de la Luz	6,000	144	147
GUERRERO:			
Garduno y Anexas	7,200	30	35
HIDALGO:			
Amistad y Con	9,600	66	70
Carmen, aviada.	1,100	200	225
Guadalupe Fresnillo. Mill.	1,000	170	200
Guadalupe Fresnillo Mine.	1,400	70	80
Maravillas y An., aviador	1,680	90	110
Maravillas el Lobo	1,000	130	180
Refugio, aviada.	12,800	5	7
Sta. Gertrudis y An aviadas	9,600	7	10
Sta. Gertrudis y An., aviadora	28,800	73	74
San Rafael y An., Trompillo	1,200	2,150	2,200
San Rafael y An., aviada	1,200	$740	
Soledad, aviada	670	1,100	$1,200
Sorpresa, aviada	960	300	315
MEXICO:			
Aldebarren	2,000	30	38
Buen Despacho	3,000	48	53
Dos Estrellas	3,000	3,400	3,500
La Esperanza (El Oro)	3,000	1,500	1,500
Santa Ana, Esperanza	2,400	15	30
NUEVO LEON:			
La Fraternal	1,000	580	620
Norias de Bajan	1,000	700	750
SAN LUIS POTOSI:			
Concepcion y An.	3,000	26	30
El Barreno, aviadora	2,000	100	105
Sta. Maria de la Paz	9,600	226	228
ZACATECAS:			
Asturiana y An	2,500	8	12
Candelaria y Pinos	2,500	40	50
San Carlos y Annexas	2,500	20	25
Sta. Maria de Gaud.	2,500	75	85
MISCELLANEOUS:			
Bartolome de Medina	2,000	85	90
Naica (Chihuahua)	100	11,000	13,000
Natividad (Oxaca) aviadora	1,800	650	750
San Francisco Hac.	6,000	85	90
Union Hacienda	3,000	340	360

Paris.

Jan. 19.

Company.	Location.	Par value.	Latest dividend.	Prices. Opening.	Prices. Closing.
		Fr.	Fr.	Fr.	Fr.
Acieries de Creusot	France	2,000	75.00	1,865.00	1,860.00
Anzin, Coal	France	.....	290.00	5,560.00	5,535.00
Biache-St. Vaast	France	1,000	160.00	3,605.00	3,605.00
Boleo, c	Lower California	500	104.17	2,450.00	2,626.00
Bruay, Coal	France	400	27.50	700.00	700.00
Courrieres, Coal	France	500	110.00	2,800.00	2,801.00
Escombrera-Bleyberg, z. l.	France	350	35.00	736.00	720.00
Huanchaca, s.	Bolivia	125	2.50	92.50	89.00
Laurium, z. l.	Greece	500	25.00	344.00	340.00
Malfidano, z.	Italy	500	50.00	636.00	640.00
Metaux, Cie. Fran. de.	France	500	22.50	507.50	518.00
Mokta-el-Hadid, i. l.	Algeria	500	40.00	1,039.00	1,010.00
Nickel, n.	N. Caledonia	250	22.50	642.00	641.00
Penarroya, Coal	Spain	500	45.00	1,205.00	1,185.00
Vielle Montagne, z.	Belgium	30	30.00	850.00	850.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. s—Silver. z—Zinc.

London.

Jan. 27.

Company.	Par Val.	Latest dividend. Amt.	Latest dividend. Date.	Quotations. Buyers.	Quotations. Sellers.
American:	£ s.	s. d.		£ s. d.	£ s. d.
Alaska-Treadwell	5 0	4 0	Jan., 1905	5 10 0	5 15 0
Anaconda	5 0	2 0	Nov., 1904	5 6 3	5 8 9
Camp Bird	1 0	9	Feb., 1905	1 11 3	1 13 9
Copiapo	2 0	5 0	Oct., 1904	1 10 0	1 15 0
De Lamar	1 0	2 0	Nov., 1904	15 0	17 6
El Oro	1 0	9	July, 1904	1 1 3	1 3 9
Frontino & Bolivia	1 0	rts.	Mar., 1904	14 0	15 0
Le Roi	5 0	5 0	Nov., 1899	13 9	16 3
*Le Roi No. 2	5 0	2 0	Jan., 1905	16 3	18 9
Mesquital	1 0	3	Feb., 1903	3 3	3 9
*Mountain Copper	1 0	3	Jan., 1905	3 10 0	3 15 0
Montana	1 0	6	Apr., 1899	6	1 0
Palmarejo & Mex.	1 0	3	Nov., 1904	12 0	13 0
Stratton's Indep'd	1 0	6	Dec., 1904	5 3	5 9
St. John del Rey	1 0	6	Dec., 1904	12 0	13 0
Tomboy	1 0	1 0	Dec., 1904	1 5 0	1 7 6
Tyee	1 0	2 0	Dec., 1904	2 1 3	2 3 9
Ymir	1 0	1 0	Mar., 1902	2 6	5 0
European:					
Libiola	5 0	1 6	May, 1904	1 11 3	1 13 9
Linares	3 0	5 0	Sept., 1904	4 0 0	4 10 0
Mason & Barry	1 0	7 0	May, 1904	3 0 0	3 5 0
Rio Tinto	5 0	32 6	Nov, 1904	62 15 0	63 0 0
Rio Tinto, pf	5 0	2 6	Nov., 1904	6 2 6	6 7 6
Tharsis	2 0	7 0	May, 1904	5 5 0	5 10 0
West Australian:					
Associated	1 0	2 6	July, 1904	2 0 0	2 1 3
Cosmopolitan	1 0	1 0	Apr., 1904	4 6	5 0
Golden Horseshoe	5 0	6 0	Nov., 1904	6 11 3	6 13 9
Great Boulder	2	9	Dec., 1904	1 1 0	1 1 6
Gt. Boulder Perse	1 0	1 0	Sept., 1904	10 6	10 9
*Great Fingall	1 0	7 6	Jan., 1905	7 17 6	8 0 0
*Ivanhoe	5 0	5 0	Jan., 1905	7 13 9	7 16 3
Kalgurli	1 0	2 6	Jan., 1905	6 10 0	6 12 6
Lake View	1 0	1 6	Oct., 1904	1 6 3	1 7 6
Oroya-Brownhill	1 0	4 0	Dec., 1904	3 7 7	3 8 7
Miscellaneous:					
*Brilliant Central	1 0	6	Feb., 1905	18 9	1 1 3
*Brilliant & St. Geo.	10	9	Jan., 1905	21 0	22 0
Briseis Tin	1 0	.....	.....	10 0	11 0
Broken Hill	8	1 6	Feb., 1905	2 4 0	2 5 0
Mt. Lyell	3 0	1 3	Dec., 1904	13 6	14 6
Mt. Morgan	1 0	3	Jan., 1905	2 15 0	3 0 0
Waihi	1 0	2 6	Dec., 1904	6 10 0	6 12 6
Indian:					
Champion Reef	10	1 5	Jan., 1905	1 11 1	1 12 3
Mysore	10	4 6	Nov., 1904	6 12 6	6 15 0
Nundydroog	10	1 6	Nov., 1904	1 6 5	1 7 7
Ooregum	10	9	Dec., 1904	17 5	18 1
Ooregum, pf	10	9	Dec., 1904	1 3 9	1 6 3
South African:					
Angelo	1 0	5 0	Feb., 1905	7 1 3	7 3 9
Bonanza	1 0	7 0	Feb., 1905	1 10 0	1 12 6
British So. Africa	1 0	rts.	May, 1899	1 15 9	1 16 11
Cape Copper	2 0	6	Jan. 1905	4 6 3	4 8 9
Cape Copper, pf	2 0	6	Jan., 1905	3 15 0	4 0 0
City & Suburban	4 0	6 0	Feb., 1905	5 17 6	6 2 6
Consol. Gold-F'lds	1 0	2 6	Dec., 1904	8 2 6	8 3 9
Crown Reef	1 0	18 0	Nov., 1904	15 10 0	16 0 0
De Beers, preferred	2 10	10 0	Feb., 1905	17 16 3	17 18 9
De Beers, deferred	2 10	2 0	Feb., 1905	17 13 9	17 16 3
East Rand	1 0	4 0	Feb., 1905	8 13 9	8 15 0
Ferreira	1 0	27 6	Feb., 1905	24 0 0	24 10 0
Geldenhuis	1 0	5 0	Feb., 1905	5 10 0	5 12 6
Geduld	1 0	rts.	Mar., 1902	7 2 6	7 5 0
Henry Nourse	1 0	8 0	Feb., 1905	8 0 0	8 5 0
Heriot	1 0	5 0	Sept., 1899	3 12 6	3 17 6
Jubilee	1 0	5 0	Feb., 1905	3 15 0	4 0 0
Jumpers	1 0	2 6	May, 1904	2 5 0	2 10 0
Knights	1 0	.....	.....	6 2 6	6 5 0
Langlaagte	1 0	2 0	Feb., 1905	3 12 6	3 17 6
May	1 0	4 0	Feb., 1905	4 2 6	4 5 0
Meyer & Charlton	1 0	5 0	Feb., 1905	5 2 6	5 7 6
Modderfontein	1 0	rts.	Apr., 1902	10 5 0	10 7 6
Namaqua	2 0	3 0	Dec., 1904	3 16 3	3 18 9
New Goch	1 0	.....	.....	3 8 9	3 11 3
New Kleinfontein	1 0	rts.	Apr., 1902	2 8 9	2 11 3
New Primrose	1 0	3 0	Feb., 1905	3 3 9	3 6 3
Rand	5	5 0	Aug. 1904	11 0 0	11 2 6
Randfontein	1 0	rts.	Apr., 1899	2 18 1	3 0 7
Robinson	5 0	8 0	Feb., 1905	10 0 0	10 5 0
Robinson Deep	1 0	3 0	Aug., 1904	6 5 0	6 7 6
Rose Deep	1 0	3 0	Feb., 1905	8 12 6	8 17 6
Salisbury	1 0	2 0	Jan., 1905	1 12 6	1 17 6
Sheba	1 0	rts.	Feb., 1904	8 0	8 6
Simmer & Jack	1 0	6	Aug., 1904	2 2 6	2 3 9
Village Main Reef	1 0	4 0	Jan., 1905	6 15 0	7 0 0
*Wemmer	1 0	12 6	Dec., 1904	9 10 0	10 0 0

*Ex-dividend.

London (By Cable).*

Company.	Feb. 7 £	s.	d.	Company.	Feb. 7 £	s.	d.
Camp Bird	1	12	9	Esperanza	1	0	6
Con. Gold Fields	8	0	0	Modderfontein	10	10	7½
De Beers	17	17	6	Rand Mines	11	0	0
Dolores	1	8	0	Rio Tinto	62	15	0
East Rand	8	11	10½	Simmer & Jack	2	3	1½
El Oro	1	1	10½	Tomboy	1	7	6

*Furnished by Wm. P. Bonbright & Co., 24 Broad St., New York

Questions and Answers.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others beside the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Zinc Chloride.—We are anxious to ascertain, if possible, the market for zinc chloride in the United States; its use, etc. Can you help us?—N. F.

Answer.—This chemical salt, worth in New York 4.625@4.875c. per lb. in the granulated state, and about half as much when in solution, is used principally for preserving timber, especially railway sleepers. For this purpose the zinc chloride should be free from iron, and often purchasers will stipulate as to the percentage of oxychloride. Other uses are for weighting cotton goods, 'mercerizing' cotton so that it resembles silk, and as a flux in galvanizing. Consumption in this country is met by an increasing domestic production, and imports of 10,000 to 15,000 lb. per annum, paying a duty of 1c. per pound. It would aid you when considering the manufacture of zinc salts to read 'Production and Properties of Zinc,' by Walter Renton Ingalls.

Pyrites Fines.—Please give as definite information as you have at your command in regard to what size of Pyrites fines is generally preferred by consumers of this mineral, using Herreshoff burners. Please say whether it would be important, to ensure perfect burning, to have the grains of same size, or whether they may, without disadvantage, consist of various sizes, say 1 to 7 millimeter.—A. H.

Answer.—An expert of much experience gives us the following statement: "The ideal pyrites fines for use in a mechanical furnace of the MacDougall type would consist of a granular ore, sized, as nearly as possible, to 2 millimeters, and entirely free from dust. As a matter of fact, the extremely divided fines, containing lumps up to 10 mm. and over, and much impalpable dust and slime produced by leaching the Spanish ores, and known in this country as 'washed fines,' can be successfully desulphurized in mechanical roasters, but they are extremely troublesome, both in the roaster and on account of the excessive dust produced, and are not at all popular. Generally speaking fines varying from 1 to 7 mm., and reasonably free from dust, would be considered a good quality. In this case, as in other metallurgical operations, however, the more nearly uniform the size the better the results."

Another expert says: "The size of pyrites fines which has been found to work the best in the Herreshoff roasting furnace runs from the size of a wheat grain down. Where larger pieces are mixed through, the sulphur is, of course, not roasted entirely out."

Recent Decisions.

SPECIALLY REPORTED.

PATENT CONCLUSIVE WHERE BOUNDARIES CAN BE ASCERTAINED, ETC.—The law of California, section 2077, subdivision 2, provides that when permanent and visible or ascertainable boundaries or monuments are inconsistent with the measurement of lines, angles or surfaces, the boundaries or monuments are paramount. Where a mining claim could be easily located from the description contained in the patent, by referenece to the monuments referred to, the patent was valid, and the land was not subject to relocation by reason of the fact that an erroneous length was given to the tying line in the description, which was merely a calculated, and not a surveyed line. Where a patent to a mining claim has been executed and delivered, it will be conclusively presumed that all the preliminary requirements have been properly carried out.—Gailbraith v. Shast Iron Company (76 *Pacific Reporter,* 1127); Supreme Court of California.

SUFFICIENCY OF NOTICE BY PUBLICATION ON FAILURE TO CONTRIBUTE.—Expenditures of several years for holding a mining claim may be grouped in a single notice by publication, given pursuant to the laws of the United States, section 2324, for the purpose of working a forfeiture, where a co-owner of a mining claim has failed to contribute his share toward the annual labor made necessary by that section; and such notice is not insufficient, because it was addressed to such deceased owner by name, and "his heirs, administrators, and to all whom it may concern," without specifically naming the heirs. Publication every day except Sunday in the proper newspaper, beginning Monday, Jan. 7, and concluding Tuesday, April 2, satisfies the provision for giving notice by publication for "at least once a week for 90 days."—Elder v. Horseshoe Mining Company (24 *Supreme Court Reporter,* 643); Supreme Court of the United States.

WHERE GOVERNMENT HAS PATENTED LAND TO RAILROAD COMPANY OTHERS CANNOT LOCATE CLAIMS ON SAME.—In order to make a valid mining location under section 2319 of the laws of the United States, providing that all mineral deposits in mineral lands belonging to the United States, and the lands containing the same, shall be open to entry, etc., surface ground, including the vein or lode, must be appropriated, and such surface must be the property of the United States. Where an entire section of public land has been patented by the government to the Northern Pacific Railroad Company, an entry on the same by others, for the purpose of making a mining location, without consent of the company or its assigns and grantors, was a trespass, and was ineffectual for the purpose of initiating a valid mining title—Traphagen v. Kirk (77 *Pacific Reporter,* 58); Supreme Court of Montana.

LAW OF OREGON REGARDING MARKING CLAIMS NOT IN CONFLICT WITH THOSE OF THE UNITED STATES.—Where locators of a lode claim, in marking same, omitted to establish the center end posts or monuments, and did not cause to be attached to the copy of the notice of location delivered to the clerk for record the affidavit in proof of the work done required by the laws of Oregon, section 3977, etc., such omissions were fatal to a valid initiation of their title. The requirements of the laws of Oregon are not in conflict with those of the United States, requiring that the location of such a claim shall be distinctly marked on the ground, so that its boundaries can be readily traced, etc.—Wright v. Lyons (77 *Pacific Reporter,* 81); Supreme Court of Oregon.

LIMITATIONS OF SUIT WHERE NEITHER HAS PERFECT TITLE.—Where plaintiff and defendants claimed land covered by conflicting mining claims, and defendants had not molested plaintiff, or interfered with his possession or that of his grantor, otherwise than by continuing to hold possession in the same manner as before the attempted laying out of plaintiff's claim, the burden was on the plaintiff to prove that defendants were mere intruders, having no color of title nor right to possession. Where neither party had acquired a perfect right to a conveyance from the United States, the only issue in such suit was the right to possession between them.—Bevis v. Markland (130 *Federal Reporter,* 226); Circuit Court of the United States.

The French and German governments have adopted bismuth in place of lead for the cores of rifle bullets.

There is still so much confusion between the words 'temper,' 'tempering,' and 'hardening,' in the writings of even very eminent authorities, that it is well to keep these old definitions carefully in mind. 'Hardening' is the result of rapidly cooling a strongly heated mass of steel. 'Tempering' consists in re-heating the hardened steel to a temperature far short of that to which it was raised before hardening; this heating may or may not be followed by rapid cooling. 'Annealing' as applied to steel, consists in heating the mass to a temperature higher than that used for tempering, and allowing it to cool slowly.

French Silica.

A silica sand of great purity, suitable for the manufacture of fine grades of glass, is being produced in quantity in the Fontainebleau district, near Paris. Last year some 3,000 tons were shipped to Montreal, Canada, for experimental purposes. Its value is rather low, about $1.64 per metric ton, f.o.b. Rouen, France. In the Villeneuve district a white and gray sand is obtained, and being worth about $1.158 per ton, f.o.b., may be employed in the manufacture of bottles.

It is of interest to add that the Fontainebleau product analyzes nearly 99% SiO_2, which, by the way, is fractionally less than good quality Pennsylvania sand. In America, consumption of glass sand is large, but, owing to the comparatively low market value, supplies are usually obtained in the 'gas belt' where the glass works are situated. To carry glass sand any long distance, as from France to the United States, the freight rate would absorb a large part of the selling price, even if the imported product, free of duty, should prove acceptable to certain consumers.

The supply of sand in America is extensive, but the objection is often made by glass manufacturers of too high a percentage of iron. Valuation, however, depends upon proof of analyses, and sometimes by reputation of a sand already tried.

Abstracts of Official Reports.

General Chemical Company.

This is generally known as the heavy chemical combination, with an authorized capitalization of $25,000,000, of which there is issued $10,000,000 in 6 per cent preferred stock, and $7,410,300 in common. In five years the dividends paid on both classes of shares amounted to $4,420,817, which is equivalent to over 58 per cent of the total net earnings of $7,643,569 during this period. When the consolidation was formed, in February, 1899, the appraisal of the plants controlled and the investments in other corporations stood at $13,409,784. On December 31, 1904, this account was $16,422,582, the increase of $3,012,798 being credited mostly to plants acquired since organization. Another interesting comparison to show the expansion of operations is that the surplus has increased from $478,710, on December 31, 1899, to $2,045,195, at the end of 1904.

During the calendar year 1904 the financial statement compared with 1903 as follows:

	1903.	1904.
Net earnings	$1,187,076	$1,371,951
Accounts charged off (including fire insurance)	215,976	342,812
Balance	$971,098	$1,029,139
Dividends paid	970,515	600,000
Surplus	$583	$429,139
Brought forward from previous year	1,615,473	1,616,056
Total surplus	$1,616,056	$2,045,195

Last year only the preferred dividend of 6% was paid, that on the common stock being temporarily suspended as a result of the business depression in 1903. In 1904 there was expended for new construction $329,607, and the cost of repairs and reconstruction, partly due to fire and flood in the previous year, amounted to $353,970. These two expenditures, by the way, were somewhat less than the total reported in 1903.

The manufacturing investments, at cost on December 31, 1904, were appraised at $13,745,873, and the interests in other corporations were valued at $2,676,709. The merchandise on hand, at factory cost, stood at $1,544,107. The $1,874,103, credited as receivables, were divided as follows: Customers' accounts, $1,000,292; due from corporations controlled, $769,847; loans, $103,964. Cash on hand was $468,791. The reserve fund for fire insurance (cash and securities) footed up $206,453, and miscellaneous assets, $33,214. Liabilities, besides the $17,410,300 issued capital stock, included $737,302 accounts payable, and the preferred quarterly dividend of $150,000, payable January 3, 1905.

Prospects for the ensuing year are better than for 1904, and economies in manufacturing and the improved market prices for the various products indicate continued expansion.

New York & Honduras Rosario Mining Company.

This company's plant is situated near the Pacific coast of Honduras, shipments being made via the port of Amapala. At present, mule transportation is the only available kind, over most of the route, but a Government road, to be completed within eight months, will permit the substitution of better methods. Antiquated facilities have all been replaced by modern; steel tracks, aerial tramway, electric power and illumination are among these. The report covers the year ending Sept. 30, 1904.

The average force employed was 861 men, of whom 169 were upon general labor and 215 were contractors and their men. Development completed during the year comprised 5,264 ft. of drift and crosscut, and 1,443 ft. of raise, resulting in the opening of 23,930 tons of positive ore, and 18,200 tons proved on two sides. Two continuous chutes have been completed, passing through the whole vertical extension of the mine, 1,500 ft., so that the entire output is drawn from the lowermost adit. Cost of mining averaged $13.33 per ton, of sorting, 58c., and of aerial transportation to mill, 42 cents.

The mill is arranged for stamping, amalgamating and concentrating, and has a daily capacity of 85 tons. During the year, 21,005 tons, assaying 59.54 oz. silver and 0.28 oz. gold, were treated, with recoveries of 84.35 and 86.70 per cent, respectively, at a cost of $6.14 per ton. Freight on the product—bullion and concentrate—to ships at Amapala, cost at the rate of $1.88 per ton of ore crushed. A comparison of the expenses involved in the production, shipment and refining of bullion and of concentrate, showed that the cost of the former was 40.38 per cent of its value, while the proportion in the case of concentrate, including smelter deductions, was only 15.50 per cent. Having learned this fact, the capacity of the concentrator will be enlarged, while the amalgamator will be gradually retired.

A condensed form of the profit and loss account follows:

Sale of products	$600,681
Interest	2,250
Increase in stocks on hand	121,239
Gross earnings	$724,170
Operating expenses	$485,239
New York office, including interest and taxes	21,641
Total expenses	$506,880
Profit for the year	$217,290

During the year, dividends aggregating $105,000, equivalent to 6.3 per cent on $1,500,000 capital, have been distributed. The balance, when added to that brought forward from the previous year, raises the surplus to $180,000.

United States Steel Corporation.

The preliminary statement of the United States Steel Corporation for the quarter ending Dec. 31 shows that the net earnings, after deducting each month the cost of ordinary repairs, renewals, maintenance of plant, and the interest on bonds and fixed charges of the subsidiary companies were $21,458,734. Deducting charges for interest and sinking funds, and a sum of $3,916,160 for depreciation and reserve fund, there remained a balance of $10,138,257. The dividend of 1¾ per cent on the preferred stock required $6,304,919, leaving a net surplus for the quarter of $3,833,338.

The publication of this statement enables us to make the following report of net earnings for the year, which may be slightly altered by the completed figures when the full report is published.

	1903.	1904.
First quarter	$25,068,707	$13,445,232
Second quarter	36,642,308	19,490,725
Third quarter	32,422,955	18,773,933
Fourth quarter	15,037,182	21,458,734
Total, year	$109,171,152	$73,168,624

The net earnings for the last quarter of 1904 are much larger than the preliminary estimates made by outsiders. The total earnings for the year show a decrease of $36,002,528, as compared with 1903, and of $60,140,139, as compared with 1902. Taking these preliminary figures, we find that the income account for the year 1904 was as follows:

Net earnings, as above	$73,168,624
Depreciation and extinguishment funds	$12,571,893
Sinking funds, subsidiary Cos.	1,583,110
Sinking funds U. S. Corp. bonds	4,050,009
Interest U. S. Corp. bonds	23,518,229
Depreciation in stocks, etc.	1,135,073
Total charges	$42,858,332
Balance for dividends	$30,310,292

From this balance the dividends of 7% on the preferred stock were paid, amounting to $25,219,677, leaving a balance of undivided profits amounting to $5,090,615. In 1903 the Corporation, besides paying the 7% on preferred stock, paid 2½% on the common, and in 1902 it paid 4% on the common.

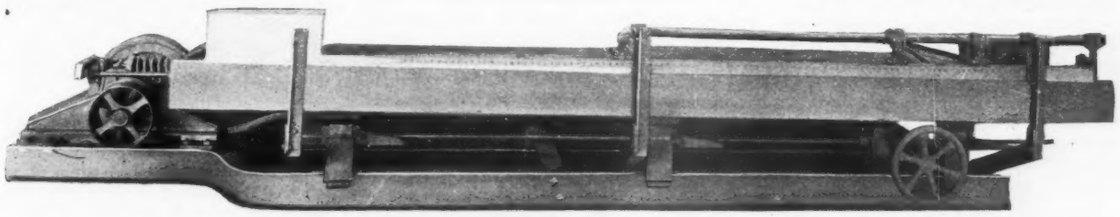
The unfilled orders on hand on Dec. 31 amounted to 4,696,203 tons of material of all kinds. This shows an increase of 1,668,737 tons, as compared with Sept. 30, 1904, and an increase of 1,481,080 tons, as compared with Dec. 31, 1903; but a decrease of 651,050 tons as compared with Dec. 31, 1902, when the business was almost at its maximum.

The Dillon Concentrator.

The accompanying illustration shows a form of concentrating table which is the result of long experience in construction of this type of machine. It is made by the Dillon Iron Works Company, of Denver, Colo., and in its design the effort has been to combine the essential features of capacity, efficiency and durability. It has also been an object to make the machine as light as possible, and its shipping weight has been kept down to 1,500 lb., a desirable feature where machinery is to be taken into a mountain country.

The concentrating surface consists of rubber corrugated lengthwise for the whole length of the table, and there are also groups of riffles running the whole length of the surface. The manufacturers claim that the efficiency of the table is high, particularly when handling pulp containing a large proportion of fine mineral. The reasons given for this are: (1) The corrugated rubber of the top. The fine mineral is stratified into these corrugations and travels along protected by the bed of pulp on top; (2) owing to the space between the groups of riffles there are several strips on the surface of the table, where the wash water flows quietly, undisturbed by any eddies caused by the riffles. This gives the pulp an opportunity to stratify itself. The arrangement of the riffles in the curved group at the discharge end of the table saves a certain percentage of the value from what usually forms the middling, rendering re-concentration unnecessary. These curved riffles increase in height towards the discharge end of the table, as they curve inward, and here saves a considerable proportion of the fine mineral, which has been carried along with the coarser gangue. Records extending over a considerable number of months show an average extraction of over 90 per cent in a concentrating mill equipped with these tables.

Some other advantages claimed are that all working parts are easily accessible without lifting heavy pieces, so that repairs and adjustments can be quickly made. The lower frame is made of steel, which will not warp, so that the top will always run true. The top frame slides in boxes, which form an oil bath, and are protected from dirt or dust. This top frame is a composite structure of wood and steel, rigid and free from vibration, yet kept as light as possible. The frames of tables which have been working two years have been found in good condition and running perfectly true. The head motion is simple but efficient, and is so arranged that both the length of stroke and the kind of stroke can be easily adjusted while the table is running. The stroke can be given a great variation; it can be adjusted to give a smooth differential reciprocating motion, and can be varied from that to a hammer-like blow.



THE DILLON CONCENTRATING TABLE.

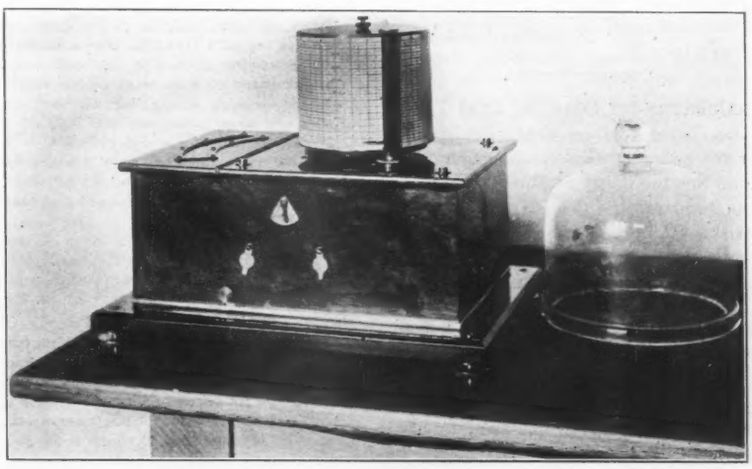
In the history of great mechanical inventions there is, perhaps, no better example of the interdependence of the engineer, the physicist and the chemist, than is evinced in the perfecting of the gas-engine.

Record of High Temperatures.

A valuable addition to the recording instruments, made by Queen & Company, of Philadelphia, is a new recording pyrometer for high temperatures. It is the result of a number of experiments, and embodies in its construction novel and valuable features. It is adapted to give a continuous record of temperatures up to 3,000° F. The galvanometer, especially designed for this purpose, is of the D'Arsonval type, and beside presenting the important feature of extreme sensitiveness, is absolutely dead beat. It is, moreover, not in the least affected by vibrations. The recorder is so arranged that the pen traces on a chart the exact movements of the galvanometer pointer.

In the clock, which rotates the recording cylinder once in every 24 hours, an electric contact is made every minute, whereby an electro-magnet is energized, which clamps the pointer of the galvanometer. This, in turn, operates a relay, causing the pen to move up and down until it coincides with the reading of the galvanometer. The pointer then swings entirely free until the next contact is made. The recording device in no way impairs the accuracy or sensibility of the pyrometer.

The thermo-electric couple consists of platinum and platinum-rhodium wires 3 ft. long, enclosed in a porcelain protecting tube. Any desired length of wire will, however, be furnished. The indicating instrument is graduated in millivolts and in degrees of temperature.



RECORDING PYROMETER.

That this new recording pyrometer is portable and that it gives a continuous record for the whole 24 hours are points of too great importance to be overlooked. The Solvay Process Company and the William Wharton Company have recently purchased recording pyrometers of this type for their works.

Spanish Chemical Trade.

Domestic production is inadequate to meet the increasing consumption of chemicals in Spain, and as a result imports are made from the United States, Great Britain, France, Germany and other nearby countries. An idea of this foreign trade may be had from the imports made in 1903, which included 513 metric tons of hydrochloric, nitric and sulphuric acids, 6,505 tons sulphur, 17,545 tons caustic soda, 16,990 tons alkali carbonates, sodas and ammonium salts (except sulphate and caustic soda) 3,771 tons chlorides (not including sodium chloride), 2,687 tons copper sulphate and 186,360 tons raw materials for manufacturing artificial fertilizers. About two years ago there were operating in Spain 23 sulphuric acid plants, 11 for distilling ammoniacal liquors, 20 for distilling coal tar products, 15 of carbon sulphide, and 54 laboratories of chemical and pharmaceutical products. Since then there has been an increase in almost all manufacturing plants.

Whalebacks for Coasting Coal Trade.

The Cleveland *Iron Trade Review* says that the policy of General Manager Coulby, of the Pittsburg Steamship Company, in modernizing the fleet of that company, consists of eliminating all vessels not strictly up-to-date and of building new vessels of the most modern construction. In accordance with the policy of selling older vessels, Mr. Coulby has just completed negotiations for the sale of 12 whalebacks to Capt. Benjamin Boutell, of Bay City, Mich., and others. It is understood that eastern people are interested with Capt. Boutell. The boats will be taken to the Atlantic coast as soon as navigation opens in the spring, and will be operated in the coal trade along the Atlantic. The boats which have just been sold are five steamers and seven barges. About two months ago Mr. Coulby sold four barges, which will also go to the Atlantic coast. The 16 vessels that will thus be taken out of the lake trade have a carrying capacity of 42,643 tons per trip, and it is estimated that in a season they would move 639,645 tons, allowing 15 trips to the season. The four steamers which are being built for the Pittsburg Steamship Company will have a capacity of 800,000 tons in a full season, but as they will not be out early in the season, the Steel Corporation will probably not have more tonnage next season than it had last year. With the four new steamers now building, the corporation will have 100 boats.

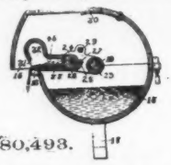
Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending January 24, 1905.

780,493. MERCURY-FEEDER FOR STAMP-BATTERIES, ETC.—Nicholas P. Carver, Edgecliffe, near Sydney, New South Wales, Australia. The combination of a trough adapted to contain a liquid, a member movably mounted above the trough, a bucket pivotally mounted on said member and having communicating lifting and measuring compartments, a guide for causing said bucket to rotate on its pivotal axis through the movement of said member for raising liquid from the trough by means of the lifting-compartment, then causing the liquid to flow into the measuring compartment and finally disharging the contents of the measuring-compartment over the edge of the trough.



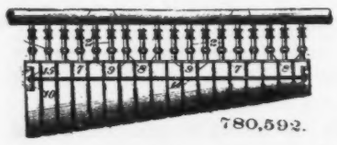
780,493.

780,518. PISTON FOR OIL-WELLS.—Glenn A. Miller, Boulder, Col. A device comprising a working barrel, a piston consisting of end cylinders fitting snugly within the barrel, and an intermediate section connecting the end cylinders, said sction being of less diameter than the end cylinders, nuts connecting the reduced intermediate section of the end cylinders, a valve-cage having a threaded body portion secured in the upper end of one of the end cylinders, said body portion having a bore formed longitudinally therethrough, a ball-valve in said cage, cups having a diameter equal to that of the end cylinders, and rings spacing the cups apart, said cups and rings being carried by the intermediate section.

780,521. TRIMMING-CHUTE.—Peter O. Olson, Chicago, Ill. A device comprising a supporting-frame; a hopper mounted on the frame and adapted to be tilted on a horizontally-disposed axis in said frame; and a spout secured in alignment with the throat of the hopper and rotatable relatively thereto; and mechanism for rotating said chute.

780,529. AMALGAMATOR.—John B. Rossman, St. Paul, Minn. An amalgamator-bowl having a circular concaved bottom, rubbers pivotally mounted within said bowl and means for imparting to the rubbers an oscillatory motion about its center and over a segment of the bottom thereof, whereby successive areas of agitated and dead water are produced within the bowl when in operation.

780,592. SECTIONAL WATER-TUBE MATTE-SPOUT.—Albert R. Brink, Anaconda, Mon. A spout comprising a plurality of water-jacketed self-contained detachable sections placed side by side, and constituting, in continuation, the spout.



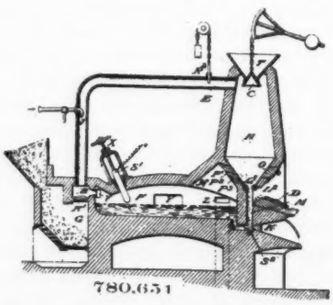
780,592.

780,579. RELEASING DEVICE FOR ROLLING-MILL ROLLS.—John L. Rehnstrom, McKeesport, Pa. A combination consisting of a base having an integral tapering shank, a keyway formed through said shank, inclined top, a longitudinally divided sectional cylindrical portion 10, the base of which corresponds to the inclined top of said shank, a ring of weaker material surrounding said sectional portion, having a tapering bore and engaging with the shank, and a tapering key arranged to bear upon the under side of said ring.

780,629. MINING-BUCKET-DUMPING APPARATUS.—William R. Wilcox, Boise, Idaho. The combination of hinged hatches, a bucket movable in the line of said hatches, a dumping mechanism including a freely-suspended bridle movable in horizontal planes and interposable in the path of said bucket, and unitary means for operating both the hatches, and the said dumping mechanism.

780,644. MILL FOR POLISHING ROUND BARS.—Victor E. Edwards, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass. In a mill for polishing round bars, the combination of two triangular frames placed in reverse position to each other and united together at their bases with the inclined faces of said frames provided with tracks; roll-housings adjustably mounted on said tracks, a pair of rolls journaled in each of said housings, motors mounted on said frames with their axes in alignment with the axes of the lower rolls in each pair of rolls, motors mounted upon said frames with their axes in alignment with the axes of the upper rolls in each pair of rolls, and couplings connecting with their respective rolls in alignment therewith.

780,651. PROCESS OF SEPARATING METALS FROM THEIR ORES.—Jean M. A. Gérard, Paris, France, assignor to Syndicat de l'Acier Gerard, Paris, France. A process of producing metals from their ores, consisting in heating a mixture of ore and carbonaceous material to reduce the ore to a metal sponge, passing through the latter an electric current to melt the same, and then subjecting the molten metal to an electric current of high voltage and low amperage in the presence of an oxidizing gas, whereby the metal is made to boil and rapid oxidation is effected.



780,651.

780,666. MINING-CAR BRAKE.—Chilton F. Kelso, Des Moines, Iowa, assignor to Spurrier Forbes & Mills and E. L. Forbes, Des Moines Iowa. The combination of two vehicles, a brake for the front vehicle, a bar at the rear of the front vehicle, a sliding bar at the front of the second vehicle, a coupler connecting said bars, and means connected with the sliding bar for retaridng the wheels of the second car, said means actuated by a rearward movement of the sliding bar.

780,686. EXCAVATING-MACHINE. — Luis Rosebush, West Bay City, Mich. In combination with a traction-engine, a platform secured to the front end thereof; a hoisting-drum mounted on said platform; devices for operating said drum from the engine; cross-beams supporting said platform; forwardly and outwardly extending legs pivotally suspended from said beams; upwardly and outwardly extending arms pivotally secured to each side of said platform;

inclined shear-legs pivoted at their upper ends to said arms; runners pivoted to the lower ends of said shear-legs; a hoisting-block secured to each of said shear-legs; cables oppositely wound on said drum and extending respectively through each of said hoisting-blocks; and scrapers secured to the ends of said cables.

780,716. METHOD OF AGGLOMERATING MAGNETIC ORE.—Elmer Gates, Chevy Chase, Md., assignor to Theodore J. Mayer, Washington, D. C. A method of agglomerating magnetic sand, which consists in establishing an electric arc between opposing surfaces, feeding opposing streams of sand over said surfaces, and causing said streams of sand to fall freely from said surfaces so as to break the arc originally formed and establish arcing from one of the falling streams to the other, thereby fusing and agglomerating the sand into small lumps of a size varying substantially from that of a wheat-grain to that of a bean.

780,729. GRINDING-MILL.—Wilhelm Rief, Hamburg, Germany. The combination in a grinding or crushing mill, with a hollow cylinder having holes widening toward the outside, of a crusher or grindstone *g*, fitted on the shaft of the motor and rotating with great speed inside the former, said cylinder *a* being provided with grooves on its inside and said crusher possessing arms which form with the cylinder wedge-shaped hollow spaces, one of said arms being adapted to crush the material to the ground, especially coffee, in said hollow spaces, whereas the other arm is adapted to press it out through the holes *h* in the wall of the cylinder.

780,738. HYDRAULIC PRESS.—Ludwig von Süsskind, St. Georgen, near St. Gall, Switzerland. An improved hydraulic press, comprising, in combination, a supporting-column, two connected boxes pivoted thereon, an abutment for engagement with one of said boxes, a receptacle, means for supporting said receptacle with its axis aligning with that of one of said boxes, a pressure-stamp and means for hydraulically and automatically pressing said stamp through said vessel.

780,747; 780,748; 780,759; 780,760; 780,761; 780,762, and 780,763. DUMP-CAR.—Spencer Otis, Chicago, Ill., assignor to National Coal Dump Car Company, Rapid City, S. Dak. The combination of a supporting-frame portion, a drop-bottom portion formed of a plurality of swinging sections secured thereto, a horizontal bar movable transversely of the car for and in engagement with each swinging section and crank-shaft mechanism for moving such bar backwardly and forwardly.

780,791. HYGROMETER ATTACHMENT.—John H. Gerrer, Elreno, Okla. A hygrometer made of a dished plate bearing graduated readings, an index-hand arranged in the dished portion of the plate, a twisted absorbent cord fixed at one end to the index-hand and a rearwardly-extending holder mounted centrally on the plate and attached at its free end to and firmly holding the outer end of the cord.

780,801. ATTACHMENT FOR GRINDING-MILLS.—Harry Kenyon, Maple Park, Ill. In an attrition-mill, the combination with the spokes of the attrition-wheels, of a blade-like member coöperating with or bearing against the sides of said spokes, and means to longitudinally adjust and anchor said blade-like member as desired.

780,804. GRAPPLING DEVICE FOR HANDLING STEEL SEGMENTS, BEAMS, ETC.—Ernest W. Moir, London, England, assignor to S. Pearson and Son, Incorporated, Long Island City, N. Y. A gripping device, comprising a bar having at one end a pin and shoulder and at the other end a pin and screw shoulder-nut, and having means by which the bar may be secured to a lifting-arm.

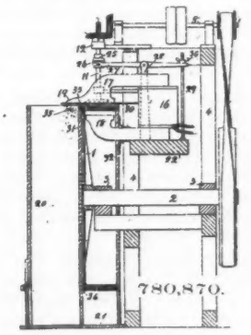
780,819. DIFFUSION APPARATUS.—Henry Schwarz, Longmont, Col. In a diffusion apparatus the combination of means for forcing the material under treatment upward against the action of gravity, means for repeatedly and intermittingly subjecting said material to pressure during its upward passage, and connections whereby a stream of water is caused to flow through and around said material in the opposite direction to the stravel of said material.

780,823. MANUFACTURE OF CONCRETE ARTICLES.—Jacob L. Shough and Robert W. Levitt, Somerset, Ohio. A molding-machine for forming concrete articles, comprising a stand, a removable false bottom on the stand, a mold-front hinged on the stand, and a vertically movable mold-support carrying the mold ends and the rear side.

780,827. CONCRETE-MIXER.—Ransom Z. Snell, South Bend, Ind. A mixer for concrete and other substances comprising a stationary inclined frame, a swinging frame arranged to be seated upon the stationary frame, a mixing-pan journaled in and carried by the swinging frame with its bottom more or less flush with the bottom of the swinging frame and having a geared flange engaged within said swinging frame, a driving-pinion journaled in the swinging frame and in engagement with the geared flange of the pan, and flexible driving connections for the driving-pinion, whereby the pan may be rotated when disposed at different inclinations with respect to the stationary frame.

780,872. ENGINE FOR OPERATING CLAM-SHELL BUCKETS.—James G. Delaney, Newark, N. J. An engine having a shaft, a drum having a threaded connection with the shaft and movable endwise thereon, a driving-gear, and a driven gear revoluble and shiftable with the drum and having shiftable intermeshing relation to said driving-gear.

780,870. MAGNETIC SEPARATOR FOR ORES OR SIMILAR MATERIALS.—John T. Dawes, Liverpool, England. In a magnetic separator the combination of a moving conveyer for receiving the material a second moving conveyer



above the first moving conveyer, a magnet-pole above the second moving conveyer, and a shield disposed under the second moving conveyer between the outer extremity of the magnet-pole and the first moving conveyer and parallel to and in contact with the side of the first moving conveyer, part of the top of the shield under the magnet-pole being level with the first moving conveyer.

780,873. WIRE-NAIL MACHINE.—Joseph F. Donaghy, Coraopolis, Pa., assignor of one-third to Edward H. Foreman, Shousetown, Pa. A wire-nail machine having in combination gripping-dies, wire-feed mechanism, a guide-passage for directing the wire to said dies, means for shearing said wire within the limits of the guide-passages.

780,900. TAMPER.—John W. Morgan, Alexander, Ill. A tamping instrument comprising a weighted member and handle portion having a tubular upper end, means to removably secure said handle to said weighted member, a threaded stem, one end of which is adapted to take into said tubular end of said handle-section, an interiorly threaded tubular handle-section adapted to take on the threaded end of said stem, and a crescent-shaped terminal secured to one end of said tubular handle-section.

780,911. BLOWING-ENGINE OR COMPRESSOR.—Gustav B. Petsche, Philadelphia, Pa., assignor to Southwark Foundry & Machine Company, Philadelphia, Pa. As a device for actuating the delivery-valve of a blowing-engine or compressor, a cylinder, having guideways for a slide extending transversely through its walls, in combination with a conduit, connecting the inner end of the cylinder with the compressing-cylinder, a regulated escape-passage for air connecting with the rear end of the cylinder, pistons working in the inner end and outer ends of the cylinder, said pistons being connected together and with the stem of the delivery-valve, a reciprocating slide working through the guideways on the cylinder and between the pistons, and means actuated by said slide for moving the pistons toward the inner end of the cylinder when the slide moves in one direction and leaving them free to move toward the outer end of the cylinder when the slide moves in the other direction.

780,943. STEAM-PUMP.—John E. Douglas, Birmingham, Ala., assignor of one-half to Augusturs J. Camp, Birmingham, Ala. In a pump, an oscillatory piston element having a plurality of parts, and a casing for the same having two chambers in one of which one of the piston parts is adapted to move and in the other of which the other piston part is adapted to move, means for controlling the supply of a motive agent to and the exhaust of such agent from, one of said chambers, and means for controlling the supply of liquid to and the delivery of such liquid from the other chamber.

780,946. METALLIC ROOFING-PLATE, ETC. Heinrich C. Ferron, Amsterdam, Netherlands, The combination with a roof or covering, of a series of locking-strips secured thereto and having loops at intervals, and metal plates or tiles having tongues at opposite extremities bent in reverse directions to engage the said loops, the tongues at one end of the plates or tiles being wholly within the bodies of the latter and defined by longitudinal slots, the openings formed by bending said tongues being closed by the contiguous ends of adjacent plates or tiles.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected With mining and metallurgy:

Week Ending January 7, 1905.

26,974 of 1903. BRIQUETTE MAKING.—W. B. Hartridge, London. Making fine coal into briquettes, by adding 10 to 15 per cent. of petroleum, 2 per cent. of lime and 3 per cent of resin.

27,298 of 1903. MAGNETIC SEPARATOR.—J. T. Dawes, Flint. Improved magnetic separator consisting of two traveling belts one above the other, the magnetic particles being attracted by means of a top magnet from the upper surface of the lower belt to the lower surface of the upper belt.

28,665 of 1903. COAL CUTTER.—A. Wilson, Edinburgh. In coal cutting machines of the chain type, improved methods of swinging the jib and for moving the machine in the direction of the coal face.

14,389 of 1904. PEAT FUEL.—H. S. Gerdes, Bremen, Germany. The use of shredded peat, mixed with an alkaline substance, as binding material in making fuel briquettes.

20,561 of 1904. BLAST FURNACE CHARGER.—W. Lahmeyer & Company. Frankfort-on-Main, Germany. Improved apparatus for elevating cars full of ores, etc., to the top of blast furnaces.

23,331 of 1904. HARDENING STEEL.—A. de Diron and G. Bouton, Paris, France. The manufacture of steel articles with very hard surfaces by cementing chrome-nickel steel without subsequent hardening by quenching.

Special Correspondence.

San Francisco. Feb. 3.

The Copper Mountain Copper Co. is not to abandon its smelting operations at Keswick, nor will any of the five furnaces be torn down. One is to be kept in continuous operation, and the others held in reserve. The new plant at Bull's Head Point, near Martinez, on the shore of San Francisco bay, will utilize the ore of the Hornet mine, which adjoins the Iron Mountain. This ore will be worked differently from that which has been mined for some years. The new plant, near Martinez, is to be quite extensive, and numbers of men and much machinery have been transferred from Keswick to the new location.

The Executive Committee of the California Miners' Association has memorialized the State legislature to pass a bill to provide for acquiring title to all swamp and overflow lands on the Sacramento and San Joaquin rivers that the engineers report to be necessary to use in the reclamation schemes. The resolution is as follows:

Resolved, That this association memorialize the legislature of the State of California to enact a law authorizing and empowering the State to acquire title to all the swamp and overflowed lands on the Sacramento and the San Joaquin rivers and their tributaries that the engineers report to be necessary to use in the work of reclaiming said lands, and in preserving the navigability of said rivers, either by voluntary conveyance from the present owners of said lands, or by the exercise of the right of eminent domain, such lands to be retained and held by the State, and, when reclaimed, to be leased by the State, and the rents accruing therefrom to be applied to the payment of the interest and principal of the moneys expended by the State in such work of reclamation and preservation.

An item in the congressional river and harbor bill of interest to hydraulic and sluice miners on the tributaries of the Sacramento river is one directing the Secretary of War to appoint three army engineers to work in co-operation with persons appointed by the State of California, to investigate the conditions pertaining to the Sacramento river and report a feasible project for the control of the river and improvement of its channel. Chairman Burton looked into this matter with care, and is convinced that it is the duty of the federal government to unite with the State authorities in controlling the river. The methods to be followed will necessarily be left to the experts.

The California Northwestern railroad has decided to abandon the use of coal and wood for its engines and will use oil. At present the company is arranging for the erection of a series of tanks at various stations along its route through Marin, Sonoma and Mendocino counties. The principal ones will be located at Tiburon, the southern terminus of the road. Three will be erected there, each to have a capacity of more than 10,000 bbl. The next one will be at Ignacio, of 1,000 bbl. capacity. This is the point of divergence of the Glen Ellen branch trains. Another of 5,000 bbl. capacity will be located at Fulton, where the Guerneville branch connects with the main line. These tanks are being constructed at San Francisco, and arrangements are under way for building the foundations for them at the places named.

It is stated that the Southern Pacific company will remove the oil-burning locomotives from the mountain division and put on coal burners, as formerly. The use of oil has not been satisfactory on the heavy grades over the Sierra Nevada range.

The anti-débris people in Sutter county are again agitating the question of damage done to the rivers by the dredgers. At a recent meeting, however, Mr. Farmer, manager of the Anti-Débris Association, conceded the point that the dredgers operating away from the river channel are doing no harm to the river; but he thought those in the river were increasing the flow of sand and débris. It is desired now to have a committee appointed by the taxpayers of Sutter county to investigate the dredgers, and if the situation demands it, then the Anti-Débris Association can take the matter up in the courts in the way of an injunction suit.

Denver. Feb. 3.

During the month of January, notwithstanding more or less unfavorable weather conditions, the Cripple Creek district produced gold to the value of $1,891,300. Had it not been that two large producers were closed down for one day, the production would as usual have passed the two-million mark. A large amount of snow fell during the month and increased the flow of surface water, impeding progress in a number of properties.

The El Paso mine in the Cripple Creek district is making a remarkable record. The net profits during the past month will be about $100,000, and it is said that the company will soon increase its dividend.

H. M. Blackmer, president of the Cripple Creek Central Railway Co., which was reported to have been sold, denies all rumors to that effect and states that it will continue to operate it as an independent property.

A number of firms, holding claims against the General Metals Co., which owns the large telluride reduction works at Colorado City, filed a petition in the United States Court asking permission to recover under a mechanics' lien, but the Court decided that their claims must be filed with the referee.

From indications it seems that the tin plate sheet mill, the framework of which has been finished for some time, will soon be completed, at the Minnequa plant of the Colorado Fuel & Iron Co. A large force of men is at work grading in the vicinity, and about 80 cars loaded with machinery are in the yards. This company intends to place electric pumps in all its coal mines in the State.

Besides building sampling works at Boulder, the Independent Smelting & Refining Co. will shortly increase the capacity of its plant at Golden, to 300 tons of ore per day, not including fluxes and fuel.

The Hydro-Carbon Manufacturing Co., the only concern which manufactures paint from elaterite, and which started here on a very small scale a short time ago, has been very successful. It is now building a large plant in this city. Starting with the manufacture of a couple of barrels daily for local consumption in September, 1903, it is now shipping its product in carload lots as far as Atlanta, Ga., and New Haven, Conn. The company makes elateroid coatings, used as preservatives on structural work; the elaterite is brought from the Uintah reservation. The business is managed by W. Van R. Whitall, its founder.

Houghton. Feb. 3.

One of the most important mining deals consummated in the Lake Superior copper district in many years has just been concluded. Charles A. Wright and wife, of Hancock, Mich., have transferred the title to all the Mendota and Sibley tracts of lands in Keweenaw county, comprising more than 100,000 acres in the vicinity of Lac Labelle, to the City Trust Co., of Boston, Mass. This is the first of a series of conveyances to be made by Mr. Wright covering large areas of mineral lands which he has secured under option in the last three months. Mr. Wright has had a gang of surveyors at work staking out the route for a railway from Calumet to Lac Labelle, it being understood that the road will be operated under the charter of the old Lac Labelle & Calumet Railroad Co. While the deals under way in Keweenaw county realty are being closely guarded, it is understood that they are being made for the Calumet & Hecla Mining Co., which is also said to be the principal interest behind the railway project. Mr. Wright is a prominent lake banker and capitalist and was the promoter and first general manager of the Copper Range Railway Co., which opened up the vast south range.

The present year opens auspiciously for the lake copper industry from a dividend point of view. While returns from sales of copper at the higher prices prevailing since last October are in some instances just beginning to be received, dividend disbursements of paying mines are already reflecting the difference in the metal market, and further improvement along this line is expected before many months have passed. The Quincy has declared a semi-annual dividend of $3 per share, or 50 cents more than six months ago, and after an absence of four years the Atlantic has returned to the dividend-paying list with a disbursement of 50 cents.

With the payment of this month's dividend the Atlantic's disbursements will reach a total of $990,000, wrung from a lode carrying the least copper of any cupriferous measure now worked successfully. The Atlantic is very frequently referred to as the finest example of the low-grade type of mine to be found in the world, but in the event of the discovery of the Baltic amygdaloid bed on section 16, of which it is the sole owner, it will stand in a fair way to lose that questionable honor. It is inferred from the smallness of the dividend that the Atlantic is husbanding its resources for use in the exploration of section 16. Developments on the north end of the Baltic, adjoining that property, render practically certain the finding of the Baltic formation by the Atlantic company. Adjoining section 16 on the south the Baltic company has traced the lode close to the line, with an excellent showing, and adjoining on the north the Superior Copper Company, composed of Lake Superior capitalists, has opened the lode with favorable results. With a stamp mill, railroad and ample machinery at hand, it is believed that the Atlantic will be in a position to open the Baltic lode on section 16 without loss of time or money.

This week marked the beginning of exploratory work on the newly-organized Erie-Ontario Development Co.'s lands to the south of the St. Mary's Mineral & Co.'s Challenge property. Captain James Chynoweth, superintendent and Michigan representative on the board of directors, went to the property with a crew of men, who will be engaged in building a camp during the next few days, preparatory to

the actual starting of development. What is believed to be the Baltic lode has been traced across the Erie-Ontario's lands for nearly a mile. The lode is uncovered for that distance, there being very little drift, which will render the preliminary work comparatively easy.

Scranton. Feb. 7.

The mineral department of the Delaware, Lackawanna & Western railway company will bring its financial year to a close on Feb. 21. This has been one of the most prosperous years in the history of the company. Figures of the output are not yet ascertainable, but the officials of the company state that the quantity of coal mined out and marketed by them is unprecedented. The company intends to sink three of the largest shafts in the anthracite coal region during the summer. When these are in working order, the company will be nearer the first place among the anthracite coal producers than it now occupies.

There are fair-sized isolated tracts of coal land in the northern end of Lackawanna valley that have never yet been touched. While the large coal deposits held out, these smaller pockets were overlooked, because the expense of working them was not commensurate with their productiveness. Now that the large mines are growing deeper and the coal relatively more scarce, the Delaware & Hudson and other companies intend to open and exploit these smaller deposits for what they are worth.

The Cayuga colliery of the Lackawanna company will be shut down for repairs for about three months. The company officials cannot definitely state when this will take place, but the miners are expecting it to shut down at any time. The timbers of the shaft are giving way. The shaft itself is very wet, although the mine is considered a dry one. The renovated shaft will be concreted from top to bottom. This is an innovation in this part of the country and one that will be watched with much interest. If it proves successful, as it undoubtedly will, probably all the shafts of the larger collieries of the anthracite mines will be lined with concrete.

The Pine Brook colliery of the Scranton Coal Co. will begin operations on March 1. The colliery is almost in the heart of Scranton. The old breaker was destroyed by fire last March and the company decided to rebuild it regardless of cost. The equipment is of the most modern type, no money having been spared in securing the best that modern engineering invention can supply. The breaker is one of the largest in Pennsylvania, and forms a conspicuous figure in the landscape for miles. The structure has been painted a dull red and a large part of it is sheeted with corrugated iron, an innovation that is as cheap as it will prove effective in preventing fire and relieving the hideousness that are so characteristic of breakers. When the Pine Brook starts over a thousand men will find employment. The majority of these are now working in other mines; but a considerable number are engaged in other industries.

Operations have been commenced at the plant of the Anthracite Coal Briquette Co. at Dickson City. The directors of the company say that the manufacture of briquette from waste culm has been demonstrated to be a complete success. If this new industry should prove as practicable as its promoters anticipate, there will not be a pound of culm that will not be put to commercial use.

A special meeting of the miners of the Exeter colliery was held in Pittsburg on Tuesday night. It is understood that it was decided that the dispute would be brought before the Conciliation Board.

The Wilkes-Barre & Scranton Coal Co. has absolutely refused to reinstate the firemen who went out on strike at the Hillman colliery at Wilkes-Barre. The firemen at the colliery quit work because two of their number were made ash wheelers, thus throwing extra work on the firemen. Other stokers were employed in the strikers' places. A deputation waited on Superintendent Carl, who refused to reinstate the men. The local representatives of the union admit that the men had no right to strike upon their own initiative.

Salt Lake City. Feb. 3.

The management of the Utah Copper company has let a contract to the General Electric Co. to install an electric haulage system to its Bingham mines. The contract calls for one 25-horsepower locomotive, generator, wiring, etc.

Samuel Newhouse began his administration as managing director of the properties of the Majestic Copper Mining & Smelting Co. on Feb. 1. He has retained Ed. F. Freudenthal as superintendent and has announced that the O. K. mine, in which it is claimed 1,000,000 tons of ore have been blocked out, is to be equipped with a concentrating mill.

James A. Pollock has been re-elected president of the Salt Lake Stock & Mining Exchange. Joseph Onerndorfer, William H. Alexander and J. B. Thompson were elected vice-presidents, while Parker Norton and James T. Shorten were re-elected treasurer and secretary. respectively.

The copper bullion shipments from the independent copper smelters last week aggregated 932,305 lb. The Utah Consolidated sent out 365,251; Bingham Consolidated, 306,124, and United States, 260,930 pounds.

The annual meeting of the stockholders of the Daly-West Mining Co. is scheduled to take place in Denver, Colo., on Feb. 20. There will probably be several changes made in the board of directors, if not in the management of the mine. Eastern shareholders are demanding representation on the board, and the indications are that they will be recognized. The company is due to declare its first quarterly dividend in March.

The annual meeting of the Columbus Consolidated Mining Co. has been called for next week, and it is probable that several changes will be made in the personnel of the board of directors. Some opposition has developed to the re-election of Tony Jacobson as president and manager, but is not likely to grow into any formidable proportions.

Two Greek laborers have filed suits in the district court against the Yampa Smelting Co. They allege personal injury sustained while employed in the construction of the new smelter buildings, and ask for judgment of $10,000 in each case. Negligence on the part of the company is also alleged.

Some interesting developments have taken place in the Silver Shield mine in Bingham during the past week, an upraise from the tunnel has encountered ore. Shipments will be made soon.

Two of the bills introduced in the Utah State legislature by Representative Joseph have been killed. One provided for the creation of a department of mines and mining, with an officer with jurisdiction over both coal and metalliferous mines; the other provided for the safety of men employed in metalliferous mines. Another bill, introduced by Joseph, providing for the taxation of mines and proceeds of mines, passed the house. This includes salt properties, which heretofore have escaped taxation.

Deadwood. Feb. 3.

The most interesting development of the week was the consolidation of the contending factions of the Hidden Fortune at Denver early in the week. The control and management of the company has been secured by the anti-Mayham element, headed by Judge J. P. Allison. Judge Allison and his following brought pressure to bear upon ex-president Mayham, and that gentleman finally resigned, and Allison was elected president to fill the unexpired term. The main office of the company is to be moved from Denver to Lead City, at which place the annual meeting of the company will be held on March 7. The suit brought by J. H. Morcom to bring the stock books of the company into court was dismissed by mutual agreement. The stockholders will shortly receive a circular letter asking them to forward their proxies to Henry Frawley and J. P. Allison, jointly, at Deadwood, S. D., that the present board of directors may be continued in office. This was agreed to by both factions. The present directors include J. P. Allison, president; T. J. Steele, Otto P. Th. Grantz; N. E. Franklin, Henry Frawley, Deadwood; J. H. Morcom, A. M. Stevenson, H. S. Shaw, Denver; William Sauntry, Stillwater, Minn. The present board of directors is regarded in a highly favorable light; the president, especially, is one of the best men among all the stockholders who could have been selected for the position. The company's mill is running at about half capacity; last month 4,500 tons were treated, and this month it is expected that the tonnage will be up to 5,000. The recovery last month was a trifle better than $5.00 per ton—a good figure, and one showing a little profit.

The Deer Lick company is negotiating for a complete hoisting plant. The company will also install a sawmill, and will possibly erect a cyanide mill this summer.

The Victoria company, owning a large property near Ragged Top, is considering bids for a 200-ton cyanide mill. Geo. S. Jackson, Deadwood, is general manager.

The Safe Investment company is planning to sink 300 ft. and thoroughly explore the ore bodies disclosed in its long tunnel. Edward Hanschka, of Deadwood, has secured the contract, and is grading for the machinery.

Spokane. Jan. 26.

Fred. H. Oliver and Andrew Laidlaw are back from New York, where they completed the deal for the sale of stock in the Morrison Mines, Ltd., to the Montreal & Boston Consolidated Co. Some time ago the Montreal & Boston offered to buy outright the property of the Morrison company, near Greenwood, B. C., on payment of one share of the big company's stock for 30 shares of Morrison. Some dissenting interests in the Morrison company, however, checked the deal in court. Now the stockholders in the Morrison, as individuals, are offered to exchange their stock on the same basis, with the provision that the Montreal & Boston stock shall be pooled until June 12. The Morrison Mines, Ltd., will continue to own the property, but the Montreal & Boston Consolidated will be the dominating inter-

est as 11-12ths of Morrison stock has been turned over under the terms of the deal.

The Montreal & Boston Consolidated up to date has paid about $100,000 on its bond for the purchase of the Dominion Copper Co.'s mines near Phoenix, B. C. Those mines, including the Brooklyn, the Stemwinder and the Rawhide, are the principal properties in the consolidation. Further payments of $12,000 a month are to be made by the underwriting syndicate which has backed Montreal & Boston Consolidated. As that syndicate included Munroe & Munroe, the New York curb brokers whose recent failure in Montreal & Boston Consolidated was so sensational, the operations of the syndicate are of interest. The company was formed with a capital of $7,500,000 in $5 shares. Of that $1,000,000 in stock was left in the treasury, and $1,500,000 in stock was paid for the property of the old Montreal & Boston company, a predecessor of the Consolidated. That left $5,000,000 in stock which was turned over to the underwriting syndicate in compensation for securing the Dominion Copper Co.'s property, the Morrison and the Athelstan mine. The syndicate was to pay $480,000 cash for the Dominion company's group, in a series of payments, of which about $100,000 has already been paid. For the Morrison the syndicate gave about $200,000 in stock, and for the Athelstan $75,000 cash and $10,000 stock. In return it secures stock of the par value of $5,000,000.

Ohio men are largely interested in mining at Chesaw, Wash., four miles south of the British Columbia line, in the northeast corner of Okanogan county. The Buckeye Gold Mining Co. is erecting a 10-stamp mill. Machinery is on the ground and excavation is nearly done. Tunnelling is progressing and ore is being stored. The Bimetallic, near Chesaw, is showing some copper ore, and W. C. Peay, the manager, says that the Ohio men backing it purpose to erect a small matteing furnace this year. The Interstate company, working the Delate and the Interstate, recently gave its mill a trial run, which is said to have shown a high saving on a feed of $30 ore carrying gold, silver and lead. The concentrate was shipped for smelting. The Opal and the Ben Harrison companies have joined in putting up a 10-stamp mill. Railway construction is eagerly awaited. Chesaw is near Midway, B. C., the present terminus of the Vancouver, Victoria & Eastern branch of the Great Northern system, running northwest from Spokane. There is little doubt that the road will be extended west from Midway, but it is uncertain whether it will go via Chesaw, or will keep on the Canadian side of the line.

Butte. Feb. 2.

The Watseca company, which has been mining ore on an extensive scale at Rochester, 40 miles south of Butte, for about five years, has closed its principal mines probably for all time. It began preparing for the suspension four weeks ago and finished the work last week. The principal stockholders in the corporation are J. B. Haggin, of New York, and A. W. McCune, who are heavily interested in the proposed copper mining and smelting enterprise of the Cerro de Pasco company in Peru; F. E. Sargeant, of New York, the estate of W. L. Hoge and Carl H. Hand. The latter has been managing the property. The company owns two mills, one of which was built about two years ago. The mills were closed with the mines, but the larger one will be used in crushing about 30,000 tons of tailing that have been accumulated.

The treatment of this tailing will be commenced as soon as spring opens. The Watseca mines have yielded about $1,500,000 in gold, but the expense of operation has been enormous on account of the heavy flow of water in the lower levels. The company opened its ore bodies to a depth of 600 ft. and pumped 900 gallons of water per minute. Sometimes the flow exceeded this quantity, going as high as 1,200 gallons. The ground at the bottom of the shaft was thoroughly explored and good ore was taken from the drifts, but with the expense attached to extraction little revenue was left after the output was treated. The company is now working the New mine in the same district.

E. M. Hand, who explored the islands of Celebes and Borneo for the Dutch government a few years ago, will resume the development of the Champion property for a New York company this week. The Champion is near the Watseca and is opened to a depth of 180 ft. The ore is gold-bearing. A son of former Senator Brice, of Ohio, owns the property, but the New York company has a lease and bond on it.

Mining had to be suspended in the lower levels of the Rarus mine of Butte last week on account of the flooding of the workings, the result of a disabled electric pump. The Rarus is owned by the United Copper or Heinze interests.

C. W. Ellingwood is extracting rich silver ore from the Goldsmith mine under lease. This mine is a mile northwest of Butte and is owned by the Tong estate. During the year ending June 1, 1904, it yielded 3,000 tons of ore containing $200,000 in silver. The lessee paid a royalty of $98,975 on the output. Work on the rich shoot was suspended last fall and the lessee commenced sinking the shaft to catch it below. The ore now being taken out is coming from the point at which the vein was intersected in the lower workings.

John A. Drake, of Chicago, has lifted his option on part of the North Moccasin mine, a gold producer of Fergus county. He is interested in other mines of that section. The North Moccasin is between the King-Barnes group and the Kendall and has been prospected 4,000 ft. with a diamond drill.

Bisbee. Feb. 1.

The Copper Queen mine is growing very rapidly; it is now making copper second only to the rate of the Boston & Montana and the Anaconda. It is ahead of the Calumet & Hecla. For some recent days the smelter at Douglas has turned out blister copper at the rate of 325,000 lb. per 24 hours, and its production for the month of January was at the rate, day after day, of 7,000,000 lb., 84,000,000 a year. There has been a steady and remarkable growth during the past year, and the increase since last March has been 2,000,000 lb. a month. This increase alone is greater than the total annual output of any but eight or nine American mines. There is no probability of as an increase for 1905, but it will be large, for the smelter will have Nacosari product all the year, Silver Bell and some others, and the Bisbee group owned by the company is turning out more ore than ever before. Two more furnaces are to be added to this plant shortly. Last week's output of copper from the Queen smelter at Douglas was 1,980,000 lb., 99 per cent fine. Just at present more matte is coming out of the furnaces than the converters can handle, and it is being stored in a reservoir. Seven hundred men are employed at this smelter now, of whom about 75 are on construction. Two blowing engines, one from the old smelter at Nacosari and one from the old works at Bisbee, have been set up, and will furnish air for the two new furnaces that will be running in a week or so. These are smaller than the five put into Douglas originally, and came from the company's former smelter at this city.

Diamond drilling in the Denn-Arizona claims, close to Saginaw and Junction, has already disclosed copper stains in the rocks, and the holes are about 600 ft. deep. The promotors feel confident they have a good prospect. Saginaw, which lies further to the southeast than any active development in the camp, is down more than 550 ft. and is in the lime; no serious hindrance has been met from water and sinking progresses fast. Junction drill work in this part of its ground has been fortunate enough to find lime underlying all the claims at this end, and in some holes mineral has been cut. All these indications have caused a small boom in undeveloped ground down Mule Pass gulch, which trends off to the east, and several companies have been formed to explore in that direction.

Lake Superior & Pittsburg has made an important find in its 1,100-ft. level, north, and is steadily drifting on that level.

The Huachuca Consolidated Gold Mining Co. has done about 3,000 ft. of work underground and claims to have opened a large ore body whose lowest assays are better than $9 per ton. It has ordered a 20-stamp mill of standard construction and will be running as soon as possible. A sawmill will also be set up on the ground. By reason of the showing made at this property the Huachuacas are on a boom, and prospectors are streaming in there every day.

"B" concentrator of the Greene Copper Co. is now running one slide, making 500 tons of concentrate daily. This aids the reduction works, as it reduces the amount of barren silica and alumina to be melted in the furnaces, and gives an ore richer in iron, sulphur and copper, thus doing away with most of the barren flux the company has been forced to supply the works.

Goldfield. Feb. 1.

An important strike has been made on the Cracker Jack claim of the Goldfield Mining Co., a mile or so north of the January mine. A four-foot ledge of high grade shipping ore has been opened up. The claim is one of a group that has not until recently been under development. The strike is of particular importance, as it proves the richness of a new section of the district. The ore shoot has been opened to a depth of 10 ft.

The owners of the Florence have inaugurated an extensive plan of development for the Florence mine. A large block of virgin ground is to be opened up. It will be several weeks before shipments are resumed, as the lessees exhausted the ore in sight before the expiration of their lease. In the future development will be kept well ahead of production.

A material improvement has been noted in the showing on the Adams-Goldfield. Good shipping ore is now being blocked out and regular shipments will be maintained after the initial consignment, which will be ready for the market within two weeks.

A contract for sinking 50 feet has been let by the Gold Button company; the work is to be done on the Tioga claim. The other claims of the company are being developed by lessees. A strong ledge of quartz has been cut at a depth of 50 ft. on the Mattie claim of the same group.

Sudbury. Feb. 3.

Great interest has been taken in the provincial elections just held. The new government is pledged to the opening up of local mining offices, with much more extended powers to the agents in charge, Sudbury and Sault Ste. Marie being the prospective points of location. This will remedy the long delay and uncertainty of recording claims at Toronto, as is now the usual thing. A custom smelter is also another plank of the new platform, together with an additional portfolio, that of Minister of Mines. It is altogether likely that the new incumbent of that portfolio will be a representative from "New Ontario." It is a difficult matter to regulate and legislate for the lumberman, settler and miner living in the same township, as it would seem that there is no township large enough to hold the three of them without their individual interests conflicting one with the other. Satisfactory legislation along this line will do much to appease the discontent that has been yearly accruing.

Cobalt, a new village on the line of the North Bay & Temiscamingue railway, is giving promise of considerable mining activity; several car-loads of silver ore have been shipped to New York for treatment, and have yielded excellent results. Two shafts have been sunk in the Dunlap-Timmins claim, one of which is down about 90 ft., and the other to a depth of 40 ft. The indications are reported as good at the 90-ft. level, and the company is now drifting in the orebody. The ore consists of silver, cobalt, arsenic and nicolite, the percentages being, respectively, 13, 10, 43 and 14 per cent to the ton of 2,000 lb. There are two other claims of much promise, one owned by W. G. Tretheway and Robert Gorman, also the Chambers-Ferland group. Ore has been shipped from all of the above mentioned claims to E. P. Earle, of New York, and some to Mr. Stiles, of the same city.

We have it upon very good authority that MacKenzie & Mann have contracted for the erection of a smelter at Port Arthur for the production of pig iron. The smelter will have a capacity of at least 150 tons of ore per day, and will be completed by Oct. 1, 1905. The company has numerous properties in the Atikokan and Mattawan districts, which lie along the line of the Canadian Northern railway, owned by them. It is expected that the erection of this smelter will employ in the neighborhood of 1,000 men.

The placer deposits on the Upper Vermilion river, north of Sudbury, are likely to be operated during the coming summer. The system of gold dredging so successfully practiced in California and New Zealand will be tried. The principal promoter is Robert H. Ahn, who has done considerable prospecting and preliminary work in the district for several years. He reports that there is an area of ground that will yield 20 cents per cubic yard. The company has secured three alluvial gold gravel locations, in all about 500 acres, on the upper Vermilion, and will commence operations during the coming season with a $50,000 dredge.

About 160 men are now employed at the Helen mine, Michipicoten, and the daily output is about 1,000 tons per day of ore. It is reported that the quality of the ore is improving, containing 60 per cent of iron, and being low in phosphorus and sulphur. One-third of Helen mine ore is being used along with the Michigan and Minnesota ore in the blast furnaces at Sault Ste. Marie.

Toronto. Feb. 2,

B. W. Folger, of Kingston, acting on behalf of the shareholders of the New York-Canadian Copper Co., has brought an action against William G. Pollock and W. L. Kimberley, of Chicago, asking for an injunction to restrain them from taking action against the company on account of several mechanic's liens. One such suit is now being prosecuted in which Richard Sandow, who has a lien against the company, is trying to enforce it against their property in Thunder Bay, comprising 325 acres of mining lands. Mr. Folger also claims from Pollock and Kimberley $25,000 damages for breach of agreement, alleging that the defendants covenanted to advance large amounts of money to cover the expenses of the work for which these liens were incurred, and further damages of $50,000 on the ground that defendants conspired to wreck the New York-Canadian Copper Co. and obtain control of its property.

Inspector Parmalee, of the Canadian Department of Trade and Commerce has returned to Ottawa, after making a tour of inspection of the oil fields of the New Brunswick Petroleum Co. in Westmoreland county, N. B. The company has at present 20 wells in operation, producing a barrel each per day, most of them located at Memramcook and Dover. They propose to develop 78 wells and erect a refinery next year and will shortly file applications for the crude petroleum bounty.

A Canadian Associated Press dispatch states that at the annual meeting of Le Roi Mining Co., in London, Eng., the chairman reported another disappointing year, but promised better things in future, owing to the discovery of ore of a higher grade. A proposal that Le Roi should amalgamate with other Rossland, B. C., mining companies with a combined capital of $7,500,000 and a working capital of from $1,500,000 to $2,000,000, was approved by the meeting.

The formal opening of the new building of the Ecole Polytechnique of Montreal, in affiliation with Laval University, took place on the evening of the 28th ult. in presence of a large and brilliant assemblage. Lady Laurier, wife of Premier Laurier, was among the guests. The edifice is situated on St. James Square near the corner of St. Catherine and St. Denis streets. The Ecole Polytechnique was founded in 1874 to give French-Canadian youths the opportunity of receiving a training in practical science. Its sphere so far has been limited, owing to the small means at its disposal, only 113 engineers having obtained degrees since it was instituted, but with the new building and improved equipment better results are anticipated.

Victoria. Jan. 31.

Boundary.—At the British Columbia Copper Co.s smelter, Greenwood, the installation of a briquetting plant is nearly completed. The company has a valuable asset in the flue dust that has been accumulating ever since operations were commenced at its works in February, 1901. It is stated that there are 14 high-grade silver-gold quartz properties being worked in the neighborhood of Greenwood and Phoenix, and that the mining costs of 9 of them are being provided by returns from ore shipped. Some of them are also yielding good profits to their owners. Shareholders in the Morrison Mines, Ltd., have received notice that the sale of the company's mine to the Montreal & Boston Consolidated Mining & Smelting Co. has been finally arranged on a basis of one share in the latter company for every 30 shares in the Morrison, the Montreal & Boston stock to be held by the Spokane & Eastern Trust Co. until June 12 next, when it will be delivered to the management of the Morrison company.

East Kootenay.—Preparations are being made for blowing in one of the furnaces of the lead smelter at Marysville now nearing completion for the Sullivan Group Mining Co. Operations will be shortly resumed at the company's mines—probably early in March. It has been announced that another 250-ton furnace is being manufactured in Spokane for these works. In the Windermere mining division, northeast Kootenay, from 15 to 20 men are kept continually at work developing the Paradise mine, while 10 are similarly employed on the Delphine. These properties, with others in the same division, are awaiting the provision of railway transportation facilities to enable them to largely increase their output of silver-lead ore.

Lardeau.—It has been reported from Ferguson that a 5-ft. shoot of clean silver-lead ore has been encountered in the Nettie L. mine, owned by the Great Western Mines, Ltd. This ore was met with in a raise being made to connect No. 3 level with the old workings of the mine. It is stated to be of higher grade than the general run of ore this mine has hitherto produced. The Nettie L. is connected with the Silver Cup chlorination mill at Five-mile by an 8,000-ft. aerial ropeway. The shoot of high-grade ore struck in the Triune mine, near Ferguson, a few weeks ago, is proving continuous. At the Horseshoe, near Trout lake, ore is being sacked for shipment and a small quantity will shortly be rawhided down to Trout lake. Development work is also being done on this claim. A 100-h.p. steam boiler for the auxiliary plant being installed at the Daly Reduction Co.s mill, to supplement whenever necessary the water power ordinarily in use for operating the mill machinery, has been received at the works. A syndicate is being formed to acquire the Horsefly claim, which adjoins the Nickel Plate property. The Maple Leaf group, situated on the south side of Similkameen river, opposite Hedley, has been bonded and is being developed. The provincial government has been petitioned to make an appropriation for the purpose of building a wagon road from Princeton to Bear creek, where there are promising mining properties, some of which will be producers whenever transportation facilities shall be provided.

Monterey. Jan. 31.

Information comes from Durango that an effort will be made to start work at once on the Guanacevi tunnel. Great credit for this should be given to Hilario Losoya, who for several years has been paying taxes on the holdings of the tunnel company and endeavoring to interest capital in the enterprise. Finally a $5,000,000 gold company was organized and A. D. Meloy undertook to sell the stock. Some New York people were interested, and it is stated that they have directed that work should begin. It is estimated that the tunnel itself will cost $1,000,000 gold. It will be three km., or 10,000 ft. in length, through San Antonio mountain, and besides cutting the numerous veins of the Guanacevi district, will give a shorter outlet for the camp, which now has to haul the ore over a three days' trip, so that freight and treatment amounts to about $75 Mexican per ton. The Soto mine, at

Guanacevi, is reported sold by Stallforth & Beckman to Boston and Salt Lake people for $1,000,000 Mexican. At Nombre de Dios, Durango, the Quebradilla mine has been unwatered under the management of R. C. Williams. W. S. Van Deusen has been made manager of the Vacas-San Marcos mines, beyond Nombre de Dios, to succeed A. C. Payne.

In the Parral and Santa Barbara districts of Chihuahua considerable new work is in contemplation. The Descubridora company, with J. F. Johnston president, and El Rayo, with Bert Peterson president, located on Cerro de Buena Vista, about 14 miles from the San José station of the Parral & Durango railroad, have formed a consolidation under the management of Mr. Johnston, and are now experimenting with the ore to determine the most suitable treatment for the 100-ton mill, on which they have decided. Donald R. Morgan has resigned his position as general manager of mines of the Torreon Metallurgical Co., to take the active and personal management of the San Diego mines, of the same company at Santa Barbara, on which a plant for the magnetic separation of the zinc from the high grade lead ores, such as that of the Moctezuma Lead Co., near by, and it is believed that Mr. Morgan's present trip to the States is in connection with this work. The San Francisco del Oro mines, Ltd., of which the Earl of Denbigh is president, and J. E. Hyslop resident manager, at Santa Barbara, also have in contemplation a magnetic separator mill, with possibly an amalgamation or lixiviation plant for the treatment of the tailing. This property is opened up by a 2,600-ft. tunnel, and has 135 pertinencias of mineral land, with some 6,000 acres of timber lands. It was purchased by the present company abort 18 months ago. In Santa Eulalia, near the city of Chihuahua, the Septentriona, comprising 15 pertinencias, has been sold to Indianapolis people for $33,000 gold.

It is believed that the Paris Rothschilds will early in February decide on the deal pending between them and Carlos Eisenmann, on the Mina del Agua in Michoacan, on which an extension of option was given last month. This is an old Spanish working, now full of water, but believed to be very rich.

The deal, at $300,000 Mexican, by which the Penoles Co., of Mapimi, Durango, acquires the mine of La America from José M. Ortiz, of Mexico City, and others, has been closed.

London. Jan. 28.

The condition of the South African mining market continues to show unexpected features. As I mentioned last week, there was a general depression, quite out of keeping with the optimistic mood prevalent a month or two ago. At that time everybody appeared to be looking forward hopefully for a rise of some sort. A large number of people have, to my own personal knowledge, been looking into South African mines with a view of buying dividend-paying shares likely to enhance in value, but find nothing suitable for their purposes. Others, who bought four and five years ago for a rise, still hold in hopes of being able to realize a profit. All this time the gold producing mines are coming nearer and nearer to their limit of life. The more speculative companies and mines are confined to deep levels, where the cost of production, the capital outlay, and the nominal capital of the companies are all so great that there is little chance of any increase in market prices. The market in Rhodesians has suffered a good deal by the further reports on the discovery of alluvial gold, referred to by me a few months ago. Examinations of the ground show the deposits to be limited, and of low grade; perhaps sufficient to bring in profits to individual workers, but quite useless for company purposes.

I wrote last week about the contemplated inauguration of several "trusts" or companies, with the object of supporting the market, and referred to one that was to be started by the Consolidated Goldfields group. This company has now been registered as the Gold Mines Investment Trust Company, Ltd., and its nominal capital is £2,000,000. More of this company will be heard shortly.

Another cause for anxiety in the South African market is the proposition made by certain shareholders for the voluntary liquidation of the Robinson South African Banking Co. This company was originally formed for the purpose of financing Mr. J. B. Robinson's mines and other ventures in South Africa, and it has had a fairly prosperous career. A year ago, however, the capital was reduced by half, as Mr. Robinson considered that they had no use for so much money. It was found that the bank stood very little chance of ever transacting much ordinary banking business, as possible clients were deterred from patronizing it on account of its admixture of businesses. In England, a bank is simply an intermediary between people who have no immediate use for their capital and people desirous of borrowing on approved security. The Robinson bank is more in the nature of a French or German "bank." As such it had its uses in attending to the finance and business of the various mining interests. Owing to its failure to find suitable outlet for its capital in other directions, its general progress has been crippled. The proposition now made by certain shareholders is, to some extent, the logical sequence of the return of capital a year ago. It is not likely that the proposition will be accepted by Mr. Robinson, or by other stockholders, especially those who paid a big premium for their shares. But that such a proposition should be made is evidence of the halfheartedness of the market.

Perth. Jan. 2.

Kalgoorlie.—The Boulder Perseverance will shortly install a new slime process plant capable of treating from 200 to 300 tons of mill residues per day. Very active development work is in progress on this mine. During November 900 ft. of driving and sinking was done. The mine is looking very well. In the Lake View Consols the shoot recently struck at the 1,600-ft. level continues to open up very well. The ore exposed is the best in the mine for a long time past. P. Ledoux has taken over the management of the Associated for the present. Important development work is in progress at the 1,000 and 1,400-ft. levels. At the former point a four-ft. body of five-ounce ore is being opened up. In the South Kalgurli the new treatment plant has arrived on the ground and will be quickly erected.

Development work is opening up extremely well on the Hainault. At the 500-ft. level three orebodies aggregating 25 ft. in width have been passed through.

At the Hidden Secret lease another rich parcel of ore—30 tons—have been treated at Fremantle smelters and yielded 501 oz. fine gold and 3,143 oz. fine silver.

Murchison.—At Black Range some excellent returns are being made, and leaseholders are very confident. Sharpe's lease crushed 57 tons for 142 oz.; Welcome lease crushed 36 tons for 69 oz.; Green and party crushed 100 tons for 321 oz.; Dream lease crushed 18.5 tons for 137 ounces.

The Victory United at Cue crushed 295 tons for 461 oz. fine gold. Work is going on well at the Great Fingall Associated.

Sydney. Jan. 2.

The record of the Bendigo Field (Vic.) is the best since the boom period of 1876. The following statement shows the production for the last two years:

	Yield. oz.	Dividends. £	Calls. £
1903.	233,589	322,415	141,977
1904.	248,000	367,896	168,095

There are in all 24 dividend-paying mines, and for the fourth year in succession the South New Moon mine heads the list. The principal producers were:

Company.	Quartz crushed. tons.	Yield. oz.	Dividends. £
South New Moon . .	28,182	37,189	120,000
New Moon.	30,140	18,099	48,000
Ulster.	8,821	11,511	32,800
Great Northern. . . .	15,889	15,133	32,250
Clarence.	18,254	9,210	18,750
Sea	7,013	6,807	16,800
Hustlers Reef No. 1.	15,293	8,331	16,192

The total quantity of gold won since the opening of this field is estimated at 16,929,000 oz. fine. The increase in the calls made during 1904 is taken as an indication of strong confidence on the part of investors. The work of deep sinking has been prosecuted with great perseverance, but so far no results of any value have been obtained. At the New Chum Railway mine a depth of 4,056 ft. from surface has been reached by means of a winze from the 3,856-ft. cross-cut, while at the Victoria quartz mine a depth of 4,024 ft. has been obtained by a winze sunk from the 3,700-ft. level. It is intended to continue the prospecting work to a still greater depth. The noteworthy feature of the year's operations was the location of the New Argus Reef at a depth of between 1,680 and 1,780 ft. This should enable a number of mines to resume work and maintain a profitable output during the present year.

Although the mines on the Charters Towers Field, Queensland, have contributed a large yield, the production is much below that for the year 1903. The last crushing of 1,703 tons of quartz from the principal mine, the Queen's Cross Reef (Charters Towers, Queensland) gave a return of 2,880 oz. of gold. The returns from the Mount Morgan mine (Mount Morgan, Queensland), show an all-round improvement, and the dividend declared during the past month absorbed £12,500.

The Broken Hill mines have maintained the usual extensive output, and the Field is the scene of marked activity and prosperity. During the past year five of the companies distributed dividends amounting to £294,500, as follows: Proprietary, £192,000; South, £40,000; Sulphide Corporation, £41,250; North, £13,750; British, £7,500. These dividends, together with bonuses, etc., bring the total distribution by the companies on this field up to £12,253,000. The erection of 22 additional magnetic separators at the Central mine should enable the output of zinc concentrate from this mine to be more than doubled. The directors of the British Broken Hill mine report a profit of £10,500 on the operations of the past half-year. It is stated that the whole of the output for the year 1905 has been sold on satisfactory terms.

Personal.

Mining anc metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. W. H. Kritzer is at Goldfield, Nevada.

Mr. Phillip Argall has returned from Mexico to Denver.

Mr. V. G. Hills is making examinations in Boulder county, Colorado.

Mr. N. A. Dunyan, of Salt Lake City, has recovered from a serious illness.

Mr. J. T. Brooks, of Philadelphia, is in Durango, on professional business.

Mr. Leonard Sivyer, of Los Angeles, is in Sonora, Mex., on professional business.

Mr. L. W. Powell has been appointed assistant manager to the Oliver Mining Company.

Mr. A. J. McMillan has been re-elected managing director of Le Roi mine, at Rossland, B. C.

Mr. Wm. B. Potter, of St. Louis, Mo., is in the southern part of Mexico, on professional business.

Mr. M. B. Place, general manager of the Pittsburg-San José Reduction Co., is in Chihuahua, Mexico.

Mr. J. W. Devison is now manager of No. 1 mine of the Dominion Coal Co. of Sydney, Nova Scotia.

Mr. H. P. Elwell has resigned as general manager for the Power & Mining Machinery Co., of Cudahy, Wisconsin.

Mr. J. E. Meyer, manager for the Federal Mining Co., of Utah, is in the East on professional business.

Mr. F. W. B. Johnson has been appointed superintendent for the Wood River Zinc Co., at Hailey, Idaho.

Mr. Norman McKenzie has become manager of No. 2 mine of the Dominion Coal Co., of Sydney, Nova Scotia.

Mr. Henry S. Mackay has returned to Los Angeles, after a trip to Lluvia de Oro mine, Chihuahua, Mexico.

Mr. R. S. Edwards, manager of the Kittie Burton mine at Ulysses, Idaho, has returned from a visit to New York.

Mr. W. S. Van Deusen has been appointed manager of the Vacas-San Marcos mines near Nombre de Dios, Mexico.

Mr. D. W. Shanks, manager for the Almoloya Mining Co., at Cerro Almoloya, Mexico, is visiting in this country.

Mr. E. C. Engelhardt has been appointed consulting engineer to the Gold Dirt Mines & Milling Co. in Gilpin county, Colorado.

Mr. Eugene Coste has returned to Toronto from a trip to the Santa Maria oil fields in Santa Barbara county, California.

Mr. Geo. E. Farish, son of Mr. John B. Faris, is metallurgist for the Crestone-Coloradoa Co., at Torres, Sonora, Mexico.

Mr. B. Collin, former manager of the Mexican Central Railway, has been appointed manager of La Luz mines, Mexico.

Mr. H. J. Arkell has gone to Bluefields, Nicaragua, to install and operate a cyanide plant for the Siempre Viva Mining Company.

Major Duncan Stuart, registrar of mining at Johannesburg, South Africa, is visiting at Hamilton, Ont., his former home.

Mr. L. Hundeshagen, of Penang, Sumatra, who has been examining metallurgical plants in this country, is returning to Sumatra.

Mr. Norman W. Parlee is engaged in professional business at Dillsburg, Pa. Mr. Parlee was formerly at Rossland, British Columbia.

Mr. John W. McComb has been appointed financial agent and accountant to the Mineral Development Co., at Guanajuato, Mexico.

Mr. R. H. Burrows has been appointed resident superintendent and mining engineer to the Mineral Development Co., at Guanajuato, Mexico.

Mr. Fred H. Chase, general manager for Brockton-Alaska Mining & Commercial Co., is returning to Fairbanks, Alaska, from a visit at Troy, N. Y.

Mr. William V. Kelly has been elected vice-president, a member of the executive committee, and a director of the American Steel Foundries Company.

Mr. A. Sydney Additon has completed the installation of a 10-ton cyanide testing plant on the property of the Lavic Mining Co., at Lavic, California.

Mr. Frank Lewis Nason, who for the past three months has been engaged in examining placer mines in the Isthmus of Tehuantepec, Mex., and in the State of Oaxaca, has returned to Connecticut.

Mr. C. M. Fueller, of Denver, Colorado, is at Atlantic City, Wyo., directing the starting of the cyanide plant of the Dexter Mining & Development Company.

Mr. J. Clark Channing, president of the Tennessee Copper Co., is at Bingham, Utah, making an examination of the property of the United States Mining Company.

Mr. R. V. Anderson, a student in the department of geology of Stanford University, has sailed for Japan, where he will make a special study of geological conditions.

Mr. Alexander McEachran, formerly manager of No. 2 mine of the Dominion Coal Co. at Sydney, N. S., will assume the management of the International mine of the same company.

Mr. J. H. Plummer, president and managing director of the Dominion Iron & Steel Co., of Sydney, N. S., is suffering from a severe illness. Latest reports indicate some improvement in his condition.

Mr. R. C. Shaw, for the last four years manager of the Thayer Mining & Milling Co., of Costa Rica, has recently been made vice-president and manager of the Montezuma Consolidated Gold Mining Company.

Mr. Donald R. Morgan has resigned as general manager of mines for the Torreon Metallurgical Co., at Torreon, Mex., to take the management of the San Diego mines of the same company at Santa Barbara, Mexico.

Mr. Anton Eilers, who was chosen a director of the Greene Consolidated Copper Co. at the last election, has resigned his position on account of disagreement with the policy of the controlling interest in the company.

Mr. D. A. Carpenter, for the past three years manager of the Mexico City office of the Sullivan Machinery Co., has resigned that position to become general manager of the Humphrey's Manufacturing Co., of Mansfield, Ohio.

Mr. E. A. H. Tays has resigned his position as manager of the mines and smelters at Maconi, Mex., and has returned to the State of Sinaloa, where he will re-open his office in Fuerte, and again engage in his regular practice as a mining engineer.

Obituary.

Richard George Legg, for many years superintendent of mines at Bingham, Utah, and in Nevada, is dead at Monrovia, Cal., of consumption, aged 52 years.

Philip Eastwick, of Portland, Ore., a well-known civil engineer, died at Panama, from yellow fever, on Feb. 1. Mr. Eastwick served in the American navy under Admiral Farragut. He had charge of many government works on the Pacific coast.

T. J. Cooper, a pioneer miner of Colorado, died Jan. 18, at Fruita, Colo. He was one of the original settlers of Park county, and was active in operations in the early days of Leadville. Mr. Cooper carried on mining operations in Idaho, North Dakota and Alaska. He is survived by a widow, daughter and a son.

Herbert Jerome Davis, chemist, popularly known as the "father of the pyrite trade" in this country, died suddenly of heart failure in London, on January 28. He was born on June 14, 1844, at Hancock, N. H., and at 26 years of age settled in San Francisco, where he was a merchant until 1873. Since that time he has been a resident of New York, and for 23 years was engaged in selling pyrite. He was owner of the Davis pyrite mine, at Rowe, Mass., and imported considerable quantities of the well-known San Telmo and Granada ores from Spain. Mr. Davis rendered good service in introducing pyrite as a source of sulphur for the manufacture of sulphuric acid, and besides being interested in a furnace for burning the ore, operated a plant in New Jersey for recovering the copper from the pyrite cinder. He was president of the Davis Sulphur Ore Co., and the American Copper Extraction Co., and was a member of the Lawyers', Lotus, and other prominent clubs. Personally Mr. Davis was most genial, and as a friend and business associate his death is regretted.

Societies and Technical Schools.

Rensselaer Polytechnic Institute.—Gifts to this institution at Troy, N. Y., aggregating $465,000, are reported. They include $125,000 from Andrew Carnegie, $50,000 from J. J. Albright, of the class of '68, $100,000 for a memorial to a graduate whose name is withheld, and an equal sum pledged from the same source, with $90,000 raised by the alumni.

Institution of Mining & Metallurgy.—At a meeting of the provisional standardization committee on Jan. 11 it was decided that the following should form the central standardization committee, with power to add to its number: Mr. Bird, secretary to the sectional committees; R. W. Raymond, James Douglas, T. A. Rickard, J. Bonsall Porter, Alfred James, C. J. Alford, Walter McDermott, A. K. Huntington, Arthur C. Claudet, E. Hooper, T. Kirke Rose, J. H. Cordner-James, H. L. Sulman, W. Fischer Wilkinson, William Gowland and W. H. Trewartha-James. It was further decided that the following be invited to co-operate in the work of the committee by commenting and advising upon draft advance reports: THE ENGINEERING AND MINING JOURNAL, The Chemical, Metallurgical and Mining Society of South Africa, The South African Association of Engineers and the Chamber of Mines of Kalgurli.

Trade Catalogues.

The Westinghouse Machine Co., of East Pittsburg, Pa., has prepared an exceptionally handsome catalogue, with illustrations, in which is described the Westinghouse-Parsons steam turbine.

Catalogue No. 9, of William R. Perrin & Co., of Chicago, Ill., is devoted to a description of the well-known filter presses made by this company. There are many satisfactory illustrations of these filters and their parts.

From the Lake Shore Engine Works, of Marquette, Mich., we have received an attractive catalogue of hoisting engines, rock crushers, ore cars, ore skips, cages, rope sheaves, and general mining requisites which are made by this company.

The Hardsocg Little Wonder drill, and the Herron & Bury compressors are described in a tasteful catalogue recently issued by the Hardsocg Wonder Drill Co., of Ottumwa, Ia. It is illustrated, and contains many testimonials from those who have used the Hardsocg drill with satisfactory results.

The National Electric Co., of Milwaukee, Wis., has begun the issue of the 'National Electric Catechism.' Starting with the first principles of electricity, it deals with the definitions of electrical units, and it is intended to lead, eventually, to an interesting series of questions and answers. It will be mailed to those to whom it will be of interest.

The A. Leschen & Sons Rope Co., of St. Louis, Mo., is sending out a card announcing the awards on its three exhibits —one for wire rope, one for wire rope tramways, and one for conveying and transmission haulage outfits—received at the St. Louis Exposition. The card also contains a valuable table for the dimensions of standard wire ropes.

Industrial.

The Isthmian Canal Commission announces that it will receive proposals for rock drills to be used in construction of the Panama Canal. Communications may be addressed to the Isthmian Canal Commission, Washington, D. C.

Catalogues and price lists are desired for the files of Clement & Strange, engineers and contractors for mining, milling, smelting and power plants, who have opened new offices at 307 Dooly Block, Salt Lake City, Utah. Catalogues covering the above lines will be preserved and consulted.

In equipping its new English shops where the steel cars for the London Underground railway are to be built, the American Car & Foundry Co. has purchased from the Ingersoll-Sergeant Drill Co. its entire pneumatic equipment, including air compressors and Haeseler hammers and drills.

The Wilgus Manufacturing Co., of San Francisco, reports having furnished one of its Duplex oil burning apparatus to the Matson Navigation Co., for the oil burning steamer "Enterprise," 1,200 h.p., and also to Hatch Bros. for the passenger steamer "Arrow," plying between Mare Island and San Francisco, California.

The Mines and Metallurgical Co., of No. 11 Broadway, New York, has been appointed the exclusive agent in the mining, metallurgical and chemical industries of the United States, Canada and Mexico for the systems of effecting economy in the combustion of coal owned by the Eldred Process Co., which are already in extensive and successful use.

An Edwards furnace is being erected at the Eagle-Shawmut mine in Tuolumne county, California, for the purpose of roasting mother lode concentrate. For after-treatment the chlorination process will be used. At the Yampa Smelting Co. plant, near Salt Lake City, from May to November, 1904, about 7,000 tons of ore were treated in an experimental Edwards furnace, and a 100-ton duplex furnace of that kind will soon be in operation.

The Vulcan Iron Works, of Seattle, Wash., is making a water-power hoist, which it recommends for sinking a shaft or lowering ore or other material down the mountain side, using the brake to lower and the water to haul back the empty carrier. The dimensions are as follows: Floor space, 30x30 in.; height to top of casing, 24 in.; capacity of drum, ½-in. wire rope, 750 ft.; lifting capacity, ¾-in. nozzle, 200-ft. fall, 1,100 lb.; weight of machine, 650 lb.

The A. S. Cameron Steam Pump Works, New York City, report the sale of three more of their horizontal piston pumps to the O'Rourke Construction & Engineering Co., of New York City, contractors, for the improvement in the Pennsylvania railroad tunnel, delivery being made to the Manhattan side. The above named construction company also has quite a number of Cameron pumps in use on the Weehawken side of the Pennsylvania tunnel, and also along the line of the improvement in the New York Central railroad tunnel in New York City.

The Watson Manufacturing Co., of Jamestown, N. Y., has recently been allowed a patent on an all-metal window screen, composed entirely of non-rustable material. The screen works on the same principle as the wooden-frame screens, which the firm has been manufacturing and will continue to manufacture. The screen has several features of advantage. It is comparatively light in weight, the wire cloth is very smoothly and tightly stretched, lifts are convenient and inconspicuous. In case of breakage of springs, which is a common fault with many screens, the spring used in the Watson screen can be removed and replaced without the use of tools. Strength and durability are prominent features, and one has only to compare it with others now in use to become aware of its superiority in all points.

The Pelton Water Wheel Co., of San Francisco and New York, reports recent sales as follows: A 700-h.p. Pelton wheel for the hydraulic plant of the Grande Ronde Electric Co., of Oregon, which will close down the steam and water turbine plant immediately upon the completion of the new hydraulic station. The pressure under which the new wheel will operate is 877 ft. A 450-h.p. Pelton wheel for the Nanaimo Electric Light & Heating Co., of British Columbia. This water wheel belts to a line shaft, now driven by steam engine; the latter will be used to help out the Pelton wheel at periods of low water and peak load. The Silver Lake mines, of Colorado, has ordered a 600-h.p. Pelton wheel, to be direct coupled to a 400-h.p. Allis engine. The two prime movers will drive generators in the large power plant of this mining company. A 450 Pelton wheel unit is also under course of construction for the territorial government of Hawaii, besides a 900-h.p. unit for La Grande Water Storage Co., of Oregon.

General Mining News.

CALIFORNIA.

AMADOR COUNTY.

Central Eureka.—Instead of the regular five cent dividend for December, this mine paid one of seven cents.

Climax.—Superintendent Aitkin says it is contemplated to enlarge the milling plant at this mine when the ledge on the lower level is fairly developed.

South Eureka.—The old mill at this mine will not be closed down when the new one is completed, but both mills will be kept at work.

Treadwell.—This mine, at Volcano, B. K. Worley, superintendent, which has been idle some time, will shortly resume operations and start up the mill.

CALAVERAS COUNTY.

Gravel.—J. S. White, of Oakland, has put M. H. Sunderland in charge of operations at his gravel mine in the Calaveritas road.

Johnson.—At this mine, on the San Andreas gravel channel, owned by D. Fricot, with J. B. Luddy as superintendent, work of reopening has commenced.

Reed.—At this mine, Geo. Glover, foreman, a building is being put up for the hoist and mill.

San Andreas Blue Gravel Co.—This company has commenced the work of installing new machinery.

EL DORADO COUNTY.

Mother Lode Mining Co.—This company has acquired both the Havilah and New Montezuma mines, at Nashville, and is preparing for active development work. The Havilah mill is to be enlarged and a tramway is to be built from the Havilah to the New Montezuma, so that the two mines may be worked jointly.

Rio Vista Copper Co.—The shaft at this mine is down 300 ft., and will be continued 300 ft. further. No more treasury stock is being sold, there being money enough on hand to open the mine and put up the smelter.

Union.—At this mine, Georgetown, a Dodge pulverizer is being set up by Superintendent Isgrig. This gravel property was formerly known as the Delmaza mine.

KERN COUNTY.

Pine Tree and Baltic.—Strikes have been made in both these adjoining mines, near Tehachapi, owned by residents of that town, among them J. A. Darnal, A. Aucken, R. M. Durison and J. W. Murray.

MADERA COUNTY.

Hildreth.—At this old camp several strikes have been made lately. John Butten and O. A. Cole are taking out rich ore from their claim near the San Joaquin river. In the Misfortune, owned by H. Sim and J. R. Ryan, several small ledges, carrying good ore, have been found. Markle Brothers and E. Topping are taking out rich ore from their claims.

MARIPOSA COUNTY.

Le Grand Mining Co.—The machinery of the North Star mine, owned by this company, has been started up. A number of new locations have been made near the mine.

Legioneer Mining Co.—An Eastern company has bonded the 19 copper claims of this company and W. R. Smedberg, known as the Green Mountain copper properties. The mines have been only partly prospected.

Yosemite Mining Co.—It is reported that this company has succeeded in mak-

ing arrangements with New York and Minneapolis men to finance the Hite mine and again put it in active operation. The mine was formerly a famous producer.

NEVADA COUNTY.

Champion Mining Co.—This company, at Nevada City, has filed a $25,000 bond, which has been approved, and the attachment on the personal property, levied by the Home Mining Co., has been released. The undisputed territory will now be worked again.

PLACER COUNTY.

Channel Bend.—The restraining débris dam at this mine, recently approved by the California Débris Commission, has proved to be safe and strong.

PLUMAS COUNTY.

Claybank.—At this mine the tunnel has been running under the channel for some time, and drill holes upraised from time to time, and last week they found three feet of good paying gravel.

SAN DIEGO COUNTY.

Manganese Discovery.—Mr. A. E. Douglass writes us that a discovery has been made of a deposit of manganese ore, close to the Colorado river, about 50 miles north of Yuma, in Arizona. The discovery is on the California side of the river. The ore is psilomelane, and assays show 47% of manganese, 1 to 2.5% of iron and silica, and from 0.01 to 0.025% phosphorus; a considerable part of the balance is lime, making it strongly basic. The deposit appears to cover a large part of four claims, and presents a vertical stratification. Float from this is found for a long distance down the washes. The property is owned by men who are not promoters, but who desire to sell it.

SISKIYOU COUNTY.

Siskiyou Mining & Development Co.—This company has been organized at Ashland, Oregon, to purchase and work the Gold Bug placer mine, near Yreka.

Sundown.—Frank McGee, of Denver, Colo., has paid the $24,000 due on the bond of this mine, and a mill will be erected. The mine is on Dutch creek, in the Klamath river region.

New York.—At this property. on Indian creek, Superintendent Scott reports having found a very satisfactory ledge on the 700-ft. level. The 10-stamp mill is kept running by electric power.

Medina Gold Mining Co.—At the Johnson mine, owned by this company, at Oro Fino, Superintendent Addison is installing the new air compressor and Burleigh drill plant, to be operated by water power. A 1,500-ft. tunnel is to be run to tap the Johnson ledge, several hundred feet deep. Of this, 150 ft. has already been run.

The drilling machinery to prospect the ground around Oro Fino for prospecting purposes has been started. Ground in that vicinity formerly paid as high as $10,000 per acre by hydraulic process.

COLORADO.

BOULDER COUNTY.

Copper King Mining Co.—Cheyenne (Wyo.) parties are interested in this mine, near Boulder.

Lucky Star.—This property, in the Sugar Loaf district, has been started up by Robert A. Duncan, of Denver, with whom Eastern parties are associated, and shipments have been sent to the valley smelters, giving fair returns.

Independent Smelting & Refining Co.—This company, operating the pyritic smelter at Golden, is having a sampling works erected at Boulder for the sampling of ores from the mines of this county before shipping to the Golden smelter.

Double Star Mining & Milling Co.—This company operates the Double Star group, in Sugar Loaf district, under management of Wardner Williams. The property has been equipped with first-class top plants and buildings, and heavy developments are under way, and the extension of the Eldora branch of the Colorado & Northwestern road will enable it to ship all of its smelting product. This property is reported to be the extension of the famous Logan vein, one of the best in Boulder county.

White Crow.—It is reported that arrangements are under way for the resumption of operations on extensive lines on this property, in the Sunshine district, and that new machinery and buildings will be put up by the Eastern investors.

American Queen Mining Co.—Connecticut parties are interested in a group of claims on Left Hand creek, employment is being given to 50 men at its Star mine, which is producing a heavy tonnage of silver ores. The company expects to double its working force by spring. E. Wallace, Hartford, Conn., secretary of the company, has been making a visit to the property.

CLEAR CREEK COUNTY.

Dives-Pelican & Seven-Thirty.—The last payment has been made on this group of mines at Silver Plume, the total amount being reported as $750,000, the purchasers being New York and Louisville (Ky.) capitalists. The new owners have recently installed a mammoth air compressor plant, the erection of a 100-ton amalgamation and concentration mill is well under way, and the machinery orders have been placed, and it is to be in running shape by April 1. Large developments have been under way for months, the properties are reported to show large ore reserves, and it is expected that employment will be furnished to about 200 men inside of a few months. J. H. Eaton, Georgetown, is manager of the property.

Mendota.—Negotiations are under way for the sale of this famous property, at Silver Plume, which has been one of the most prolific lead ore producers in the county. The property has been opened on a liberal scale, and for several years past a 50-ton concentrating plant has been operated, producing a carload of zinc concentrate a week from 40 to 50 tons of high-grade lead per month and several hundred tons of iron bi-product monthly.

Rich Field Mining Co.—Wahoo (Neb.) parties are interested in this incorporation, having acquired the King Solomon group of six claims and a mill site on Chicago creek. The property is to be opened through tunnel, and John Stasney, of Idaho Springs, has been placed in charge.

Waldorf Mining & Milling Co.—This company has paid its January dividend of 1 per cent, amounting to $15,000, and is preparing to erect a concentrating plant, to be built at the mouth of the Argentine tunnel. This plant is to be built in sections of 50 tons each for the treatment of the different kinds of ores.

Spanish Bar Mining & Leasing Co.—Idaho Springs parties have incorporated this company, with a capital stock of $100,000, the company taking over valuable leases held by the Home Mining & Leasing company on the Edgar vein, from Central tunnel to surface. New officers are: President, S. N. Simpson; vice-president, B. N. Simpson; secretary and treasurer, O. W. Lowell.

Slater. Mining & Milling Co.—This company has filed incorporation papers with the Secretary of State, its capital stock being $25,000, its incorporators being T. I. and E. J. Slater, W. P. Jack and A. M. Williams. Colorado and Eastern capital is interested in the operating of the Anchor property, in the Alice district.

Swedish-American Mining & Milling Co.—This company is incorporated to take over the Jenny Lind group of claims, owned by Alfred Youngberger, of Idaho Springs, and which are to be worked through tunnel operations.

GILPIN COUNTY.

Bates-Hunter.—This well-known property, at Mountain City, is to be reopened, it is reported, as Eastern capital is being interested. New machinery and pumping equipment will be necessary before regular operations can be commenced.

Cashier Gold Mining & Reduction Co.—A rich strike has been made in the Pittsburg shaft at a depth of 650 ft., a four-inch streak showing values of 32.12 oz. gold, 7.88 oz. silver and 14% dry copper, or a net cash value of $655.56 per ton. Alongside of this rich streak there is a 10-inch streak of medium-grade ore, and the prospects are good for opening up a large body of ore in the seventh level. The sixth, or present bottom level, is in better and bigger ore than any other part of the mine. The company paid nearly $10,000 dividends for 1904, notwithstanding heavy operating expenses for developments and new equipment. B. L. Campbell, Central City, is manager.

Gold Dirt Mines & Milling Co.—A contract has been let to McFarlane & Co., of this city and Denver, for the erection of a 50-ton amalgamating, cyanide and concentrating plant in Gambell gulch, near Perigo, which, together with the foundation, and office and laboratory buildings, will represent an outlay of $45,000, contract to be completed inside of 90 days. The plant is to be equipped with 10 rapid-drop stamps, each weighing 1,100 lb., the largest in the county, and the equipment is to be modern, and the new plant is to be as automatic as possible. The main building is to be 200 by 120 ft., and will be built at the mouth of the Gold Dirt tunnel. The company has a large tonnage of $8 ore, on which it expects to make a saving of $4 per ton. Work will be commenced during the coming week. J. R. Anderson, Rollinsville, is manager.

Huddleston.—Dr. W. S. Bell, of Chicago, has taken a lease and option on the Huddleston No. 1 and 2 lodes, on Winnebago hill, and has already commenced operations. The main shaft is equipped with good plant and building, and heavy developments are planned. Andy Merrick, Central City, is in charge.

Old Town Consolidated Mining Co.—An electric pump from Allentown, Pa., has been installed at the 1,500-ft. level and is throwing water at the rate of 50 gal. per minute a vertical lift of 1,000 ft. G. K. Kimball, Jr., Idaho Springs, is manager.

LAKE COUNTY—LEADVILLE.

The output for the month of January reached a little over 73,000 tons of all classes of ore. The ore received at the Arkansas Valley plant exceeded that of December by 8,000 tons.

Cloud City.—This shaft, in the downtown district, is now down 600 ft., and a quantity of water has been encountered, retarding sinking somewhat. It is the intention of the company to sink another

100 ft. and then drift toward the Midas, to catch this ore-shoot.

Gunnison.—A good body of ore has been opened in this claim, in the Sugar Loaf district, and the lessee, Walter Crippen, is able to ship three carloads a week.

Lecompton.—The ore in the tunnel still holds good, and as the trend of the shoot is directly toward the Weir shaft, where ore was struck this week, it is very possible that the Lecompton ore channel is a spur from the main ore-shoot. The trend of both shoots are the same—northeast and southwest.

McCormack Shaft.—A good grade of ore, amounting to 50 tons daily, is being sent out from this property by lessees; the character of the ore is oxide.

Penrose.—In less than two weeks this shaft should reach the 950-ft. mark, when sinking will cease. At this point a large station will be cut to accommodate three large pumps, having a combined capacity of 3,500 gal. per minute. When this work is done drifting toward the Coronado will commence.

Resurrection.—A great deal of prospecting is being done at this property at the 1,100-ft. level, and all is being carried on in virgin ground. The outlook is very encouraging. A small tonnage is being shipped daily from the upper levels.

Weir.—This shaft-rock hill, belonging to the Iron Silver Mining Co., and under lease to Murphy, Starne et al, encountered ore at the beginning of the week in the shaft; they have gone through 10 ft. of ore in the shaft, and it runs from 75 to 100 oz. silver per ton and 45% lead. The shaft is situated 1,500 ft. east of the Reindeer and is on the Nisi Prius ground. It is the general belief that it is the extension of the old Crown Point ore shoot which produced several millions 15 years ago. It is a distinct and separate shoot from the Reindeer. Sinking will be continued until the bottom of the ore is reached.

JEFFERSON COUNTY.

Independent Smelting & Refining Co.—The smelting plant at Golden has "blown in" another furnace, making the capacity of that plant 300 tons per day, as compared to 200 tons per day, which has been the amount handled since the plant was started last fall. The low rates offered by this smelter, together with the highest prices paid for metals, prompt sampling and settlement, has resulted in a number of low-grade properties being resurrected in the Clear Creek valley counties, Boulder and other mining camps. R. S. Billings, Golden, Colo., is manager.

OURAY COUNTY.

Camp Bird, Ltd.—During the month of December, 1904, the mill at this mine ran 30 days, and crushed 6,475 tons of ore, yielding 12,727 oz. of bullion and approximately 417 tons of concentrate. The amounts received from bullion and concentrate were, respectively, $189,380 and $26,421. Expenses were $53,350, leaving a balance for the month of $162,350.

TELLER COUNTY—CRIPPLE CREEK.

Forest Queen.—A suit over the ownership of a lease on this property is being tried in the district court this week. The lessee, Mr. J. K. Walsh, is being sued for a half interest in a lease on part of the property by T. E. Murray, who claims that the original lease was made out to him as well as Walsh. A large amount of work has been done on the property, and it is understood that some good ore has been discovered. The property adjoins the famous W. P. H. ground. R. A. Trevarthen is in charge of the work on the property.

Homestake.—The large new mill of this company is now nearly completed, and will soon be ready for treatment of ore. It is understood that the mill, when in full running capacity, will handle 1,000 tons per day. The company has also installed a new plant of machinery and rigged the incline shaft with skips, which admits of hoisting a large tonnage. The process used at the mill is cyanide and the ore is of low grade, oxydized variety. This ore is well adapted to economical treatment, and the result of the operations of the new mill is being watched with interest.

Katinka Gold Mining Co.—This company has filed suit in the district court of Teller county against the Mary McKinney Mining Co. for $600,000, for ore alleged to have been taken out of a vein belonging to this company. A suit was recently brought by the Aileen claim against the Mary McKinney company involving a part of the same vein, and it was on account of the successful outcome of this suit for the Aileen people that caused this suit to be brought at this time.

Portland Gold Mining Co.—Considerable interest is being manifested in the coming annual meeting of this company, which will probably result in a fight between the Burns faction and some of the other stockholders. Great effort will be made to wrest the presidency of the company away from Burns, who at present holds that office. This is due principally to the peculiar attitude taken by Mr. Burns during the recent labor troubles, whose action in this matter went a long ways toward prolonging the labor difficulties in the district.

Teutonic.—Quite a rich strike is reported on this property on Ironclad Hill, but the extent of the strike is not known. This property lies in the neighborhood of the W. P. H., Jerry Johnson and others, and is being worked under lease.

Uintah Tunnel.—A decision was handed down this week in the Supreme Court of the United States giving this tunnel the right to any ore discovered in the tunnel, provided that ore had not been discovered prior to the location of the tunnel site. The case was also sent back to the district court to determine the priority of a number of veins on different properties crossed by the tunnel; among the properties implicated are some of the Ajax and Portland companies. This suit has been pending before the supreme court for some time, and this decision will doubtless bring on considerable new litigation. The tunnel was originally located by James Doyle, but afterwards sold to the Battle Mountain Consolidated company, which is controlled by the Woods Investment Company.

INDIANA.

The legislature has passed the Curry bill revising the mining laws of the State. It was prepared by a codification commission composed of miners and operators. The bill provides for the safety and protection of miners in that it provides for safety devices and signals. It makes company stores unlawful and provides against the payment of wages in orders or tokens. The salient features of the old statute are retained, but alters slightly the weighing systems in mines and requires the posting of signals and codes about the mines.

The merger of 14 coal companies has gone into effect. The understanding is that H. R. Hammond, vice-president and general manager of the Chicago & Eastern Illinois Railroad Co., has been elected president and manager of the merger company, which takes the name of the Deering Coal Co. That the building of the Southern Indiana railroad inspired the merger there can be no doubt. It is claimed that the disposition of the coal roads to control the mining industry will spread to the bituminous fields as well, and also to the block coal fields in Clay county. The company has filed a $5,000,000 mortgage in Clay county, and the announcement of a large deal is expected soon.

NEVADA.

LINCOLN COUNTY.

Los Vegas.—About 80 miles northeast from this place, east of the Meadow Valley wash, H. P. O'Connor has located the Agnes group of seven claims and has been working them for the past three years. He says that he has a contact, one side of which is lime and the other quartzite and porphyry. His values are high in gold and silver, black sulphides in quartz. His deposit is not settled so that he can give the width of the vein. In going down the deposit widens out. This country is but little known, being over the summit and on the east slope of the mountain, about eight miles from the line of the S. P., L. A. & S. L. R. R.

OREGON.

DOUGLAS COUNTY.

Rainbow Mining, Milling & Smelting Co.—Mr. H. Banfield, manager of this company's property at Drew, writes us as follows: "We are cross-cutting an orebody which is 70 ft. wide. The last place in which the ore was cross-cut was 48 ft. wide. It is a copper proposition, the ore being chalcopyrite, carrying some gold values."

TEXAS.

HARDIN COUNTY.

Sour Lake.—This field is having a new boom. Bass & Benckenstein well, which was drilled to the lower oil stratum, is said to be gushing 5,000 bbl. daily.

Votaw.—On the Sutton well, near here, good progress is being made, and the drillers expect oil in paying quantities.

HARRIS COUNTY.

Humble.—The Parafine Oil Co.'s well is in. It gushed freely, but its present capacity has not been definitely ascertained. The Texas company is seeking a right of way for a pipe line to Houston. The lines leading to Beaumont will be in operation in February.

JEFFERSON COUNTY.

Beaumont.—The E. H. Bowen & Co. well, being drilled near McFaddin, two miles east of Spindletop, is down about 1,500 ft. That earthen storage, while valuable on account of its rapid construction, is extremely wasteful, is shown by the new regulations posted at Humble by the Texas company. The company deducts 25% of the net runs, which is held in an emergency account pending accurate knowledge of the loss occasioned by seepage and evaporation. To cover extra expense of handling, 2½ cents per barrel, in addition to the regular pipage and storage charges is also exacted. Large buyers are busy with contract oil, and outside demand is slower, at unchanged prices. The railways are rapidly filling all their

available tanks with cheap crude and are rushing construction of new tankage.

LIBERTY COUNTY.

Barber's Hill.—With the number of wells now under way, it will soon be demonstrated whether or not this field is a paying proposition. The Higgins Oil & Fuel Co. is down about 1,100 ft.; P. Higgins No. 1,500 ft.; Pearl Oil Co., 1,100 ft.; Mary Ellen No. 1, 1,200 ft. J. Revere & Co. and E. Fisher are also drilling.

UTAH.

CACHE COUNTY.

King.—This property is the scene of considerable development. A tunnel is being run to tap an orebody recently uncovered in some surface workings. The property is owned by Leo Neilson, of Logan, Utah, who says enough ore has been developed to justify the erection of a concentrator, which is likely to be done, possibly during the present year.

JUAB COUNTY.

Tintic Shipments.—Last week shipments aggregated 93 carloads, the shippers being: Bullion-Beck, 6; Carisa, 1; Centennial-Eureka, 44; Eagle & Blue Bell, 6; Gemini, 11; Grand Central, 7; Godiva, 1; Mammoth, 8; May Day, 1; Uncle Sam Consolidated, 1; Uncle Sam (concentrate), 1; Yankee Consolidated, 5.

Daly-West.—Three large stopes caved in between the 1,200 and 1,400 levels. The accident occurred between shifts and no one was hurt.

Daly-Judge.—While the management is keeping matters quiet it is generally believed in camp that developments in the mine are of a very promising character. There has been a strong demand for the stock at advanced prices, and no other reason is assigned for the rise.

Lower Mammoth.—At the annual meeting the old board of directors, with a single exception, was retained. Sidney Bamberger, of Salt Lake, was made general manager.

New York Bonanza.—Drifting on ore on the 600-ft. level is progressing with encouraging results. A small vein is being followed which contains high-grade values. A winze is being sunk to the 700-ft. level.

Yankee Consolidated.—A new board of directors has been chosen, which organized by the election of John E. DuBois, president; J. E. Frick, vice-president; L. A. Amsden, secretary and manager. The headquarters of the company is at Salt Lake City.

SUMMIT COUNTY.

Park City Shipments.—Last week shipments aggregated 2,976,366 lb., the shippers being: Silver King, 1,494,140; Daly-West, 1,250,000; Keith-Kearns, 164,250; New York Bonanza, 67,876.

New York Bonanza.—The directors of this company have decided to continue the winze being sunk in this property to the 800 level. A carload of ore at the samplers during the week assayed close to 200 oz. in silver, 11% lead and $237 in gold.

Silver Bell.—Late developments in this property are encouraging. A drift being run 50 ft. below the tunnel level has encountered a streak of rich silver ore, with indications that the main ledge will shortly be broken into.

Silver King.—A new cable rope for the aerial tramway was installed during the week.

TOOELE COUNTY.

Consolidated Mercur.—The strike made in this property, near the Ingot property, continues to hold out, and the management is much encouraged.

Honerine Drain Tunnel.—This has been completed to the length of 7,040 ft. and has reached a point directly under the Honerine shaft. An upraise will be made.

Dewey.—Some high-grade silver ore is being mined at this property, also in the Clifton district, for shipment to the Salt Lake market.

Lucy L.—An upraise is being made to connect the main tunnel with the shaft. Gold ore containing sensational values was recently encountered. The property is located in the Clifton district, on Deep Creek. F. L. Wilson, of Salt Lake, is manager.

Stockton Mill.—This plant is turning out a 50 per cent lead concentrate. Only about 25 tons of ore are being treated daily owing to a shortage of water.

UINTAH COUNTY.

A seven-foot vein of coal has been opened at Blue Hill, near Vernal. John Packer is the owner of the property.

VIRGINIA.

BUCKINGHAM COUNTY.

Anaconda Gold Mining Co.—Under the management of W. E. Craig, this company is erecting a Snodgrass washer for treating the placer ground on its property, consisting of 300 acres. E. W. Reaugh is president and W. E. Craig, secretary and treasurer. The capital stock is $25,000. The production to date is about $20,000.

WASHINGTON.

FERRY COUNTY.

Galena King Mining & Milling Co.—This company owns six claims in a group, situated a mile southeast of the Mountain Boy mine—the Galena King, Galena King No. 2, Galena King No. 3, Myrtle, Cushion and Cushion No. 2. On the Galena King No. 2 is a quartz cropping from 20 to 30 ft. wide, an open-cut crossing, 18 ft. of which gave an average assay in silver and lead of $12 a ton. About 100 ft. to the northeast an incline shaft goes down 20 ft. on a three-foot vein, samples from which assayed $13 to $70 in silver and lead. From the bottom, 18 ft. of a drift and a winze 8 ft. deep are on the same vein. Within a few feet, on the Galena King, a shaft has been sunk 20 ft. on a 13-inch stringer of ore that assays about $25 a ton. From an elevation above a flat at the foot of the hill, a tunnel has been driven 180 ft. towards the cropping referred to. About 50 ft. to run will bring it under the open-cut, at a depth of about 80 ft. This is a promising prospect.

Liberty.—This group adjoins the Old Glory on the southeast and is on the same contact or veinal system, with croppings in all directions. On the Copper Plate, one of the group, a stratum of ore, three feet wide, is reported to carry nine per cent copper, besides some silver, lead and a trace of gold. On the Liberty, another claim of the group, good lead ore has been uncovered. On the Glory Hole is an extensive capping of limonite, with a little lead showing.

Old Glory.—This group consists of five claims, situated on the west side of Old Glory mountain—the Mosquito, Blanco, Old Glory, Iron Chest and Nespelem. It is claimed that the whole mountain side is a solid mass of ore, and that it makes the biggest mineral showing on the reservation; that it is a contact vein, about 1,500 ft. wide. Huge croppings appear at short distances all the way up the hill and traverse the length of two or three claims. Whether they combine in one immense mass or lie in strata, separated by country rock, remains to be demonstrated by development underground. The croppings are claimed to have been well exploited, and assays are reported to have run up to $80 a ton in silver, copper and lead. Good values were found in galena ore, taken from a shaft, 30 ft. deep, on the Nespelem ground. The work on that shaft was abandoned to drive tunnels and crosscut under the big croppings. Two were started; one of them is in 30 ft., and entirely in low-grade ore, which runs mostly in silver and lead; the other is in 60 ft. and nearly all in ore, much of which is low grade, but principally iron sulphide, carrying silver, copper and a little gold, assaying from about $6 to $60 a ton. At the portal of this tunnel, a shaft was started and sunk on a seam of ore that ran well in copper; but at the depth of six feet, water came in too fast to be bailed out, and it was abandoned. The strike of the contact is northeastward, with a bed of granite on the northwestern and quartz porphyry on the southeastern side.

WYOMING.

CARBON COUNTY.

Penn-Wyoming Copper Co.—The Ferris-Haggerty mines, at Encampment, recently sold to the North American Copper Co., have been transferred to this company by the former. The new corporation has $10,000,000 capital stock. The output of the smelter at Encampment in 1904 is understood to have averaged about 550,000 lb. per month. The smelter is to be enlarged, new steam power added supplementing the water power, so that runs may be continuous and the output from mine and smelter should be materially increased.

PHILIPPINE ISLANDS.

Philippine Mining Co.—This company was organized in Boston some time ago, to investigate the gold-bearing gravel deposits found in the island of Masbate. The results of test work were so satisfactory that a dredge was ordered from the Risdon Iron Works, of San Francisco, which was recently received at Manila, and is now being put together on the property. The gravel deposits are said to be very large, and to have a fair average yield in gold. Mr. F. L. H. Kimball inspected the property for the company, and will have charge of the operation of the dredge. Should it prove successful, it will be followed by others.

Foreign Mining News.

AFRICA.

TRANSVAAL.

Premier Diamond Mining Co., Ltd.—The annual report of this company gives the following results for the year ending October 31, 1904:

	1903.	1904.	Inc.
Diamond sales . . .	$687,175	$4,330,150	$3,642,975
Expenses.	172,860	991,460	818,600
Net.	$514,315	$3,338,690	$2,824,375

The mining operations may be thus summarized:

	Loads washed.	Carats.	Value stones.	Val. per load.	Cost per load.
1904	939,265	749,653½	$4,330,150	$4.61	$0.63
1903	76,931	99,208	172,175	8.92	1.12

During the year, the report says "the mine produced large stones, equal in quality to anything yet found in South Africa." The capital of the company has been 80,000 £1 shares, which are now to be converted into 160,000 preferred shares of 5s., carrying a cumulative dividend of 250% per annum, and 320,000 preferred shares of 2s. 6d. each.

AUSTRALIA.

In view of the encouraging reports which have been received respecting the copper lodes on the Cloncurry field, Queensland, the government of that State is co-operating in a proposal to thoroughly test them. It is intended to sink five shafts at different parts of the field to depths of 200 ft. During the last four-weekly period the Mount Lyell Co. (Queenstown), Tasmania, smelted 31,880 tons of ore for 600 tons of blister copper containing: copper, 592 tons; silver, 57,203 oz. and gold 1,874 oz. It has been mentioned in previous letters that the aggregate thickness of the ore bodies located by the diamond drill at the 600-ft. level on the North Lyell mine was 60 ft., and it is now intended to drive east from the main shaft to further explore these. The mines at York Peninsula (S. A.) are maintaining a satisfactory output, and during the last fortnight the Wallawo and Moonta Smelting Co. (South Australia) treated 1,317 tons of ore for a return of 223 tons of copper.

Tin.—The report of the Stannary Hill Tin mines, Queensland, shows that the quantity of ore treated during the past six months was 8,596 tons, for a return of 298 tons of concentrate, averaging 71% metallic tin. It is stated that it has been difficult to send a fair average grade of ore to the mill during the progress of the necessary development work, and consequently the output was low for some weeks. The development work will, however, shortly be completed when a much larger output can be handled at a considerably lessened cost. The output of black tin from the Briseis and New Brothers Home (Derby), Tasmania, amounted to 34½ tons for the month. The large body of drift is now available for treatment, and it is intended to increase the output from this month on. At Copes Creek, Tingha (N. S. W.) [New England District], the dredging for tin is an important industry, and some exceptional results have been obtained. One dredge secured a ton of tin ore per diem for a period of 52 days, and during the month of November 127 tons of tin ore were won in this district.

As the result of the fall in the price of Wolfram numbers of men on the Queensland fields have relinquished work and a general exodus has taken place. At Wolfram camp (Cairns, Queensland) only about a dozen claims are now worked, and the holders are carefully restricting the output.

The Colliery Employees' Federation of the northern district of New South Wales has endeavored to obtain a prohibition from the Arbitration Court restraining the colliery proprietors from giving effect to the notice issued by them, and which fixed the selling price of coal at 9s. a ton from Jan. 1. The men's wages rise or fall according to the declared selling price of coal, and it was contended by the Federation that the action of the proprietors would result in a reduction of 10% in wages, and the motive of the proprietors was to enable them to enter into undue competition in the internal and foreign markets. The proprietors in reply showed that a number of collieries were shut down on account of the slackness of trade, and that it was now impossible to obtain a higher price than 9s. a ton f. o. b. for best Newcastle coal. The Arbitration Court held that the proprietors were entitled to fix the price of coal at a lower figure and to pay the miners a reduced hewing rate. It is thought that the miners generally will abide by this decision and no serious interference with the coal trade will result.

The government of New South Wales has decided to invite tenders from persons willing to undertake the manufacture of iron and steel within the State. It is contended that the presence not only of the iron ore in enormous quantity, but also of coal within easy access, as well as limestone, etc., marks the State as being in an unusually favorable position for the profitable carrying out of an undertaking of this nature by private enterprise. The government's proposal is to take from the manufacturer for a certain number of years all the iron, etc., required for use in connection with the railways and public works of the State at a fixed price. A guarantee to take not less than a certain quantity will probably be given. So soon as details are arranged it is intended to advertise extensively for tenders.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending Jan. 28 were as follows, in tons: Granby, 8,460; Mother Lode, 2,368; Brooklyn, 830; Rawhide, 551; Sunset, 88; Mountain Rose, 66; Emma, 429; Oro Denoro, 33; Senator, 264; total for the week, 13,089 tons; total for year, 53,750 tons.

BRITISH COLUMBIA—THE COAST.

Although the Van Anda mines, on Texada island, are at present closed down, it is probable work will be resumed shortly. The bondholders, who lately were again put in possession of the property, have purchased the hoist, cage and other plant put in by the late lessees, and the Copper Queen mine is being kept free from water. H. W. Treat, formerly manager of these mines, is expected to return to the Coast next month. The Copper King, one of the Surprise group, also on Texada island, is being re-opened. The sinking of a 200-ft. shaft was lately commenced, the shaft going down in ore. Preliminary shipments to the Tyee Copper Co.'s smelter, at Ladysmith, Vancouver Island, will be made within a few weeks. It is understood that American capitalists are negotiating for a lease of the iron property on Texada island, known as the Iron mine. If the negotiations be successful the iron furnace at Irondale, Puget Sound, will be again blown in and the ore will be treated there. The Cascade Copper Co. recently shipped some ore to Ladysmith from the Cascade mine, on the west coast of Vancouver Island. Returns are reported to have been between $30 and $40 per ton net. The Loyal mines, on the west side of Texada island, have been leased by a Mr. Jacobs, of Seattle, who is inviting tenders for sinking a shaft. The Marble Bay mine is working steadily on a large body of bornite ore encountered at the 600-ft. level. A steam boiler and larger pumps are being installed. This mine is being successfully operated by the Tacoma Steel Co. The lime kilns at Marble Bay are turning out lime up to their full capacity. More kilns will shortly have to be erected to keep pace with the demand for this superior lime, which readily finds a market on the Pacific coast and at Honolulu. Wm. M. Brewer recently visited Gribbell Island, on the northern coast of British Columbia. Two American companies, both organized at Bellingham, Washington, have been carrying on mining operations on the island for several years. While the ore is not high grade, the properties are advantageously situated for both mining and shipping.

NOVA SCOTIA.

Dominion Iron & Steel Co.—The output of this company, at Sydney, for 1904 amounted to 143,113 tons of steel of all kinds, and 96,601 tons of pig iron. The company imported 222,000 tons of iron ore and 175,000 tons of dolmite for use in blast furnaces. There were consumed 385,000 tons of coal, mostly in the manufacture of coke, of which the production was 170,000 tons. The production of tar amounted to 1,650,153 gallons; of sulphate of ammonia, 346,557 lb.; of sulphuric acid, 2,631 tons.

MEXICO.

CHIHUAHUA.

San Francisco del Oro Mines, Ltd.—This company is a group of mines in the Parral district. It is said to be shipping 130 to 150 tons of ore daily over the Parral & Durango railroad to the big custom smelters. It is now proposed that the company erect its own plant, of a kind that shall be especially adapted for the class of ore. Probably it will be wet concentration, magnetic separation, the slimes and tailings then to be mixed with silicious ores and treated by lixivation. A railway is also contemplated by the company, which will tap either the Parral & Durango railroad or the Mexican Central railroad, but it has not been decided whether it will be broad or narrow gauge.

GUANAJUATO.

Mineral Development Co.—This company, at Guanajuato, contemplates active operations in developing its several mining properties—the Nueva Luz and La Torre group of mines.

SONORA.

Green Consolidated Copper Co.—The directors of this company have declared a dividend of 4%, amounting to $345,600 on the capitalization of $8,640,000. The dividend is payable on February 20. Six new directors were added to the board to fill vacancies that have occurred since the last meeting of the board. The new directors are Charles Adsit, Hornellsville, N. Y.; W. D. Cornish, New York; R. W. Pillsbury, Londonderry, N. H.; George S. Robbins, New York, and J. B. Showalter and Thomas H. Anderson, Washington. Several of these newly elected directors were formerly members of the board.

The following directors have retired: L. C. Weir, W. T. Van Brunt, G. B. Perkins, Anton Eilers and H. E. Huntington.

SOUTH AMERICA.

BRITISH GUIANA.

Exports of gold from the colony for the full year were 90,103 oz. bullion, which compares with 91,968 oz. in 1903, showing a decrease of 1,865 oz. The bullion exported this year was equal to 77,361 oz. fine gold, or $1,599,043 in value.

Exports of diamonds were 11,046 carats, valued at $85,947, which compares with 10,426 carats, valued at $124,464. There was an increase of 620 carats in quantity, but a decrease of $20,517 in value.

THE ENGINEERING AND MINING JOURNAL
MINING AND METALLURGY ESTABLISHED 1866

Colorado Iron Ore Deposits.

By James Angus Snedaker.

It may be well to record a few observations on the iron ore resources of the State of Colorado, suitable for steel manufacturing. Outside of the manganese ore bodies of the Leadville district, no notable iron mines have been discovered or developed in the State. There are two iron orebodies situated at and near the contact of the Silurian and Carboniferous sedimentaries, with the basal granites and on the western side of the large granite core, forming what is known as the Saguache range, which is one of the prominent ranges of mountains of the Continental Divide of Central Colorado.

The first of these iron ore croppings is located immediately east of the mining camp of Ashcroft, in Pitkin county, at an elevation of from 11,000 to 12,500 ft. This bold exposure of magnetite was discussed by Mr. W. B. Devereux, in the eighties, in a paper before the American Institute of Mining Engineers. This ore measure is situated on the contact of the Silurian-Carboniferous sedimentaries in connection with the diorite eruptives of the Elk Mountain range, and also a southern projection of the granites extending from the Saguache range, at or near what is known as Taylor pass. The exemplification of contact metamorphism and ore deposition in this particular deposit, is most nobly carried out by Nature. In this orebody, the large masses of magnetite out-croppings with their serrated crests rising boldly, are prominent features in the immediate landscape.

The surface area of this cropping is quite extensive; it is exposed for several thousand feet in a northeasterly and southwesterly course, having a width of from 50 to 200 ft. Mr. Devereux, in his article, stated that possibly these ores would change in depth to sulphides. I believe this iron cropping is the gossan of a large vein, and, at the change from oxides to sulphides, there is a possibility of a zone of enrichment which may be high grade enough in precious metals to be of value. The major portion of this iron is owned by the Colorado Fuel & Iron Company.

The second prominent iron ore cropping worthy of mention, is in the White Pine mining district of Gunnison county. The geological conditions surrounding this mine are similar to the orebodies at Ashcroft. It is upon the extreme southern edge of the irregular loop of the Silurian-Carboniferous sedimentaries, surrounding the base of the Saguache range, commencing at Leadville, and extending across the Continental Divide westerly, to the mining district of Red Cliff in Eagle county, thence southerly to Aspen in Pitkin county, and in a southeasterly course to Ashcroft, and along the south side of Taylor Park to the mining camps of Tin Cup and Pitkin, and ending near White Pine, in Gunnison county, near a point where the Saguache range terminates and the Cochetopa range begins, immediately north of Marshall Pass. It extends a distance of 160 miles, following the shore line of the sedimentaries. The sedimentaries are not so exposed and extensive at White Pine, as at Ashcroft. Moreover, the position and configuration of this particular body of iron ore, by the erosion of the hanging wall, has exposed a considerable body of hematite, lying conformably on the eruptives as a foot-wall.

The accessibility of this iron by a projected railroad, would make it of commercial value. I look upon this as an occurrence nearly parallel to that found at Ashcroft; the difference being a preponderance of hematite over magnetite, in favor of the White Pine orebodies. I look upon the White Pine measure as being the gossan of a large contact vein, which will likely change in depth to sulphides.

In reference to the Silurian and Carboniferous sedimentaries lying conformably around the base of the granite core of the Saguache range, it can be stated that this region has produced great amounts in silver, gold, lead and copper. This was extracted mainly above the Cambrian series, which are immediately overlying the granites.

The iron ore measures of the Cebolla district, in the extreme southwestern corner of Gunnison county, conform more nearly, geologically speaking, to certain iron ore measures of Minnesota, Wisconsin and Michigan in being situated in the Algonkian rock series. These iron ore measures were reported upon by Professor Ashburner, of Pennsylvania, in the eighties, and their merits and demerits were thoroughly discussed by his report.

The features of this particular orebody and its extent and area, would lead one to conclude that the time will come when it will be of considerable economic value. The different elements that occur in the ores may possibly be detrimental to modern bessemer practice.

The iron mines of Villa Grove in Saguache county, and the Calumet mines of Chaffee county, are not worthy of discussion. There are no other large iron orebodies in the State of Colorado, that could be relied upon, so far as present development and discoveries have determined. The iron furnaces of Colorado will rely mainly upon Hartville in Wyoming, Iron county in Utah, and a certain region in New Mexico, for their supply of iron ores in quantities.

The surface exposures of merchantable iron ore in the Ashcroft and White Pine mines are of sufficient quantity to warrant further exploration. They are near the Pueblo furnaces, which makes them especially desirable, with their high percentage of iron and minimum of detrimental elements. The limits of quantity will depend upon the depth to which oxidation has extended; this can be determined by development only.

Quicksilver Production of the World.

We have received the figures of production of the leading European mines, through the courtesy of Mr. Vincenzo Spirek, and are therefore able to give, approximately, the quicksilver production of the world for two years past. The output of the United States is that given in our issue of Jan. 5. The figures are in metric tons:

	1903.	1904.	Changes.
United States	1,288	1,480	I. 192
Austria—Idria mines	520	536	I. 16
Spain—Almaden	914	1,020	I. 106
Italy	314	355	I. 41
Total	3,036	3,391	I. 355

A metric ton is, approximately, 29.6 flasks. The total for 1904 was, therefore, about 100,374 flasks. The only producing countries of any importance not included above are Russia and Mexico, figures for which have not been received. In 1903 Mexico reported 190 and Russia 362 metric tons. Assuming that their output was about the same in 1904, and making an allowance for the smaller producers, such as Japan and Germany, would give a total for the year of 3,980 metric tons, or 134,460 flasks of quicksilver.

Tin in Bolivia.

We are indebted to the courtesy of Messrs. H. A. Watson & Company, of Liverpool, for the following statistics of Bolivian tin, which is largely handled by them. We give the figures for two years, in long tons, showing the arrivals in Great Britain:

	Ore.	Tin content.	Bars.	Total tin.
1897	4,022	2,647	1,651	4,298
1898	3,732	2,426	1,038	3,464
1899	4,103	2,667	1,273	3,940
1900	5,431	3,530	1,507	5,037
1901	9,086	5,905	1,730	7,635
1902	10,961	6,576	1,685	8,261
1903	10,401	6,240	1,614	7,854
1904	13,824	8,294	1,573	9,867

The arrivals on the European Continent are not yet completed, but are estimated at 2,000 tons for 1904. This would make a total of 11,867 tons for the year. The ore given is not crude ore, but *barilla*, or concentrate.

The statement for 1903 and 1904 may be given as follows:

	1903.	1904.	Changes
Stock, Jan. 1	184	52	D. 132
Arrivals	7,851	9,867	I. 2,016
Total	8,035	9,919	I. 1,884
Consumption	7,983	9,611	I. 1,628
Stock, Dec. 31	52	308	I. 256

In this statement all metal is included, whether in the form of bars or in ore. The output for 1904 shows a substantial increase over that for any previous year.

The Deep Leads of Victoria.

By Waldemar Lindgren.

The Victorian miner does not use the term "placer mining," nor that of "gravel mining"; instead, he speaks of "alluvial mining," including under this term superficial sluicing, drift-mining, dredging, and hydraulicking. The last operation is, however, rarely possible in that most southerly Australian State, for the simple reason that most of the deposits lie far below the surface. One of the most important assets of Victoria consists of a great system of Tertiary river channels, now deeply buried to a greatest depth of 500 ft. under accumulations of sand, clay, and basalt. These Tertiary "dead rivers" constitute the 'deep leads.' It is true that we have a similar channel system of our own, raised on the summit of the ridges of the Sierra Nevada, in California; there also the mining of the gravel by shaft and pumping has been practised, as in the Thistle mine in Plumas and Sierra counties and in the Derbec mine in Nevada county, but in both cases drainage adits have since reached these deposits. To the Victorian miner no such short cut is ordinarily available. He must often laboriously prepare for the mining operations by years of pumping with the heaviest machinery, and the tenor of the gravel must be high to offset the cost.

The output of the alluvial mines in Victoria formed but little less than a third of the total annual output of gold in 1903, which was 767,000 fine ounces. About 42,000 oz. are credited to dredging and hydraulic sluicing during the same year, bue there remains at least about 150,000 oz., or $3,000,000, which is derived from the deep leads.

Most of the old river systems are situated in the central part of the State, where the mountain system traversing it from east to west decreases in height to about 3,000 ft. and forms an irregular divide with long, level-topped ridges. Southward these project towards the basalt flows and marine Tertiary beds of the littoral, while northward they gradually descend to the broad, bush-covered expanse of the Murray plains, which occupy the whole northern part of the State. The eucalyptus-clad ranges, mostly trending north and south, are separated by broad and shallow valleys, and in these the Tertiary rivers meandered for untold ages; the country has evidently remained a land area since the Mesozoic era, at least, and possibly ever since the Carboniferous period.

During a very long time the transporting power of the streams was barely sufficient to handle the amount of débris supplied to them by erosion; these conditions, varied by slight upheavals, produced a series of benches along the sides of the valleys and comparatively thin gravel covering their bottoms. The conditions were ideal for the concentration of the gold derived from the quartz veins in the folded Silurian slates, which form the prevailing country rock, and thus it happens that the gravel of these leads is often remarkably rich in gold. We have little exact information as to the period of deposit; there are probably gravels dating all the way back from the present to the Eocene. A scant flora has been found from which it appears that, while in the Pliocene the eucalyptus prevailed as now, the Miocene flora was greatly different and characterized by such forms as lauraceous trees, cinnamomum, and salisburia. During the latter part of the Pliocene a general silting took place in the lower courses of the rivers which drained northward. This was probably due to a general sinking of the land, or at least of the northern plains. Moreover, tilting movements seem to have ensued, for in places the grade of the old rivers has certainly been decreased or even reversed, just as in the Sierra Nevada a general tilting has greatly increased the original declivities.

The final burial ceremony of the dead rivers took place towards the close of the Pliocene, when from numerous vents, all over this part of Victoria, basalt flows issued and covered enormous areas. As the heaviest lavas naturally rest in the depressions, the valley of the Campaspe, traversed by the railroad from Melbourne to Bendigo, the Loddon valley, and the Tullaroop valley became deeply covered; west of Ballarat the igneous rock surged over the divide and extended its covering mantle down to the sea. Even after a volcanic eruption, the water must find its way to the sea, and thus new river courses were laid out over the basaltic plains. Erosion again resumed its task, but without a great result; the streams meander

LONGITUDINAL SECTION OF THE CHITTERN VALLEY AND RUTHERGLEN LEAD.

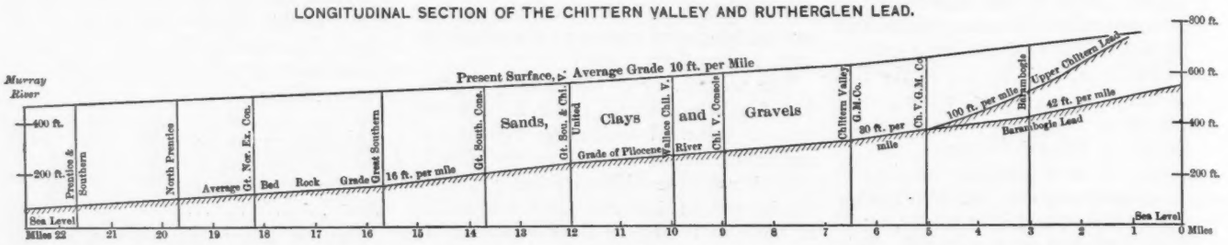
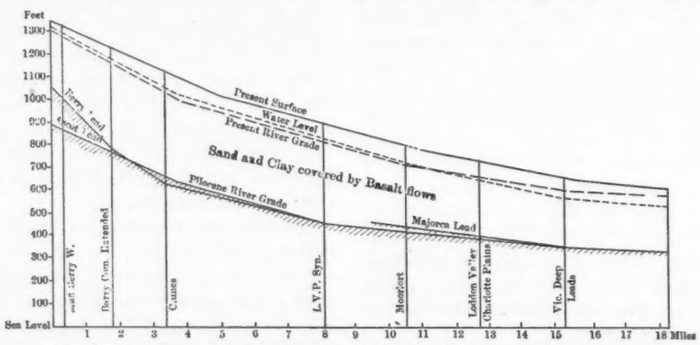
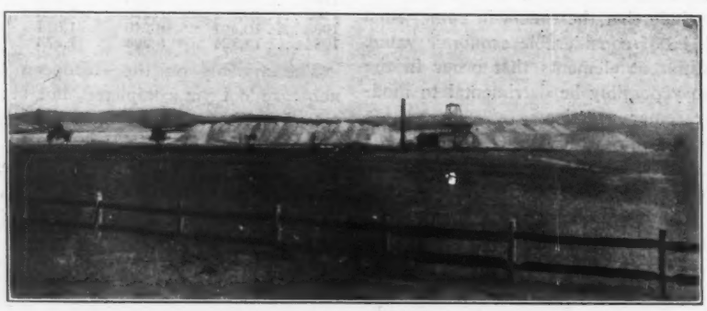

Murray River
Present Surface, Average Grade 10 ft. per Mile
800 ft.
600 ft.
400 ft.
200 ft.
Sea Level
Sands, Clays and Gravels
Grade of Pliocene River
16 ft. per mile
80 ft. per mile
100 ft. per mile
42 ft. per mile
Upper Chittern Lead
Barambogie Lead
Prentice & Southern
North Prentice
Average Gt. Nor. Ex. Con.
Bed Rock Grade
Great Southern
Gt. South. Cons.
Gt. Son. & Chl. United
Wallace Chl. V.
Chl. V. Consols
Chittern Valley G.M.Co.
Ch. V.G.M. Co.
Miles 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Miles

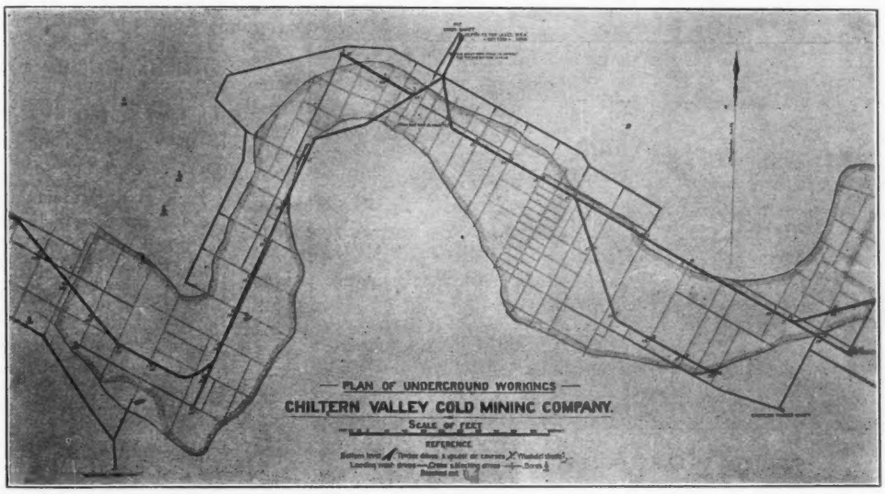
DIAGRAM OF GRADES IN BERRY, MOORLORT AND LODDON LEADS.
(After A. C. Ken.)





LODDON VALLEY—A DISTANT VIEW.

in shallow trenches at slight grades and have only in a few places, as for instance at Daylesford, been able to cut down through the bottom of the flows. The basalt often did not reach the head-waters, where the rivers broke up in gulches and gullies, and the silting has been slight. Here the argonauts washed out incredible quantities of coarse gold and here too



were the points of discovery of the deep leads from which, by extensive boring operations, largely conducted by the Victorian government, they have been traced northward for a distance of over fifty miles from their source.

There are hundreds of miles of these deap leads in Victoria. Not all of them, of course, are equally promising; the length of channel mined is insignificant compared to those as yet unopened. Thus far, the parts mined have chiefly been situated in the upper reaches of the old rivers; in the future, attention will be turned to the lower courses or the trunk streams, and the auriferous character of these is the most important question to be solved by the miner. Many of the leads are in poor districts and would probably never repay the cost of opening them. The most successful operations have been carried on near Ballarat and north of that city, on the Tullaroop plains, where the old and celebrated mines of Creswick and Clunes testify to the richness of the country; in the hills of Maryborough, Amherst, and Talbot equally renowned in the Avoca valley, and finally in the Chiltern district near the Murray river and the New South Wales boundary line. No leads of great importance have thus far been found near Bendigo.

The great Loddon system is unquestionably the richest and most important. It includes the celebrated Berry mines, whence, since 1872, $25,000,000 worth of gold has been extracted from some 12 or 14 miles of leads where they cross or follow a rich and important vein-system; it also includes the old Majorca mines, and those of several recently organized English corporations, named the Charlotte Plains, the Loddon Valley, the Moorlort, and the Victorian Deep Leads, all of which are now engaged in the costly undertaking of pumping the lower reaches of the Berry and the Majorca leads, preparatory to mining the gravel. Finally, it includes a number of important mines on a branch lead coming down to join the Loddon lead from the vicinity of Maryborough, making in all over 120 miles of deep channel, buried under lava and silt from 200 to 500 feet deep.

The gravel consists chiefly of well rounded quartz pebbles occasionally with large boulders of the same material; gold is seldom seen in these. Rarely the gravel exceeds a few feet in thickness, and it is usually covered by sand and clay. Heavy bodies of gravel, such as occur in the Sierra Nevada, are seldom, if ever encountered. The gold sticks closely to the clayey decomposed slates which ordinarily form the bed-rock and works down into it to a depth of several inches or a foot. In drifting operations it is seldom necessary to take out more than the height absolutely required for the workings, that is two or three feet. As to size of grain, there are of course great variations from the coarse, nuggetty gold of the smaller leads, near the crossing of rich lines of reef, to the moderately fine gold forming flat scales, 0.5 mm. diam., which prevails in the wide leads now worked by the Berry Extended and the Duke United mines. Further down the trunk lines the quantity of fine gold will naturally increase.

Equally variable is the width of the leads. Narrow gullies 25 to 50 ft. wide have often been worked, but in the larger mines now operated the width is considerably more. The clays and sands fill a trough, often over a mile wide, with a depth up to 200 ft. The gravel occupies the gutter, the rims of which rarely rise more than 50 ft. above the central depression, although there sometimes are a number of gradually rising benches above it. The width of the gravel attains several thousand feet. In the Spring Hill leads, worked some twenty years ago, the payable width was practically the same as that of the gutter, that is, 300 to 400 feet.

SILURIAN RANGES LOOKING WEST FROM DAYLESFORD
(Two Pliocepe Volcanic Cones in the Distance.)

A short distance northward the channels widened, some attaining 800 and 1,000 ft. In the Berry Consols Extended, now worked, and with a production of $300,000 in 1903, the gravel is taken out 900 ft. wide. At the Duke United, working on the Timor channel, a few miles north of Maryborough, the lead is up to 600 ft. wide. Last year that mine yielded about $260,000. In some cases, as in the Majorca lead, the bench-gravels have proved richer than the gutters. The Chiltern and Rutherglen lead is constant in width, ranging from 300 to 500 feet.

LODDON VALLEY GOLDFIELDS

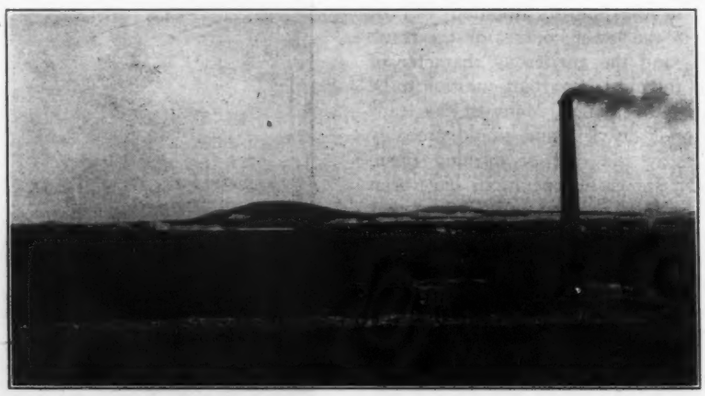
When the lead is confined between fairly narrow and well marked rims there is little difficulty; but where the gravel begins to spread over a wider flood plain, the "run of gold" may prove elusive and hard to trace. In such a case the run of gold —equivalent to what the reef miner would call a pay-shoot—does not usually spread out over the whole width of the gravel, with corresponding deterioration of grade, but persists for a long distance as a well-defined streak beyond which, at the same bed-rock level, the gravel may be extremely poor. At intervals the run of gold will "peter out" and to all appearances become lost; but intelligent prospecting sideways will usually succeed in picking it up. After this offset it may continue as wide and good as before. The Woady Yalloak, the Homebush, and the Duke United offer instances of this peculiar behavior. The pay is usually best where the lead follows the strike of the slate; where crossing this direction, uneven bed-rock and scattered values are apt to prevail.

The Victorian miner measures the value of the gravel by the square fathom; this is, of course, unsatisfactory, in as far as it gives no exact data of volume and weight; ordinarily one fathom may be taken as the equivalent of 4 cu. yd. In general, it may be said that the deep-lead gravels are rich; they have to be, in order to pay the necessarily high expenses of pumping and hoisting; timbering is also costly and the question of the supply of 'laths' or lagging is really a most serious one for the future of the industry. In the upper Berry mines average yields per cubic yard of $10 to $13 were obtained; in the celebrated Madame Berry mine this was considerably exceeded. Berry Extended now works a gravel containing $4 to $5 per cubic yard. The Duke United, during a recent six-month period, mined about 30,000 cu. yd. with an average yield of $4. In many of the Chiltern mines a similar grade of gravel obtains. The Chiltern Valley Gold Mining Co., during the last yerr, mined about 50,000 cu. yd., yielding $3.50 to $4, but in former years the average has been rather above $5. Other mines have less rich gravel. The Burnt Creek, situated some miles below the Duke United, is working on wash averaging $2.50 per cu. yd.; in the Great Southern at Rutherglen, for example, during three months in 1903, 4,148 fathoms were mined averaging 12 dwt. per fm., corresponding to $3 per cu. yd. Total expenses rarely fall much below $2.50 per cu. yd., though I believe under very favorable circumstances they have been reduced to $2; more frequently they approach $3, especially when all proper charges are taken into consideration.

The grade of the deep leads is decidedly less than that of the California channels. Near head-waters, the gulches may slope at grades of over 100 ft. per mile; lower down, declivities of 30 or 40 ft. per mile obtain, while in the lower reaches of the Loddon and Rutherglen systems they decrease to below 20 ft. per mile. In many places it is probable that the grade has been decreased, or even reversed, by tilting earth-movements. The accompanying diagrams (see p. 314) present graphically the grade of bed-rock and surface in two important and widely separated lead systems. That of the Chiltern lead is especially remarkable as showing the low elevation to which the bed-rock descends in perfectly well-defined fluviatile deposits and the long distance over which the lead is being worked, practically all of the companies indicated being actively operated at the present time.

Four great projects are now under way, the success of which will mean much for deep-lead mining of Victoria. The Charlotte Plains Gold Mines is opening the lower reaches of the Majorca lead, the Loddon Valley and Moorlort Goldfields are pumping on the lower Berry and on the combined Loddon and Berry leads; the Prentice & Southern Company is preparing to enter the lower Rutherglen lead. Large pumping plants with triple expansion engines are now handling from three to five million gallons of water in each of these mines.

A question of absorbing interest is how far the gold-bearing formation and the gold-bearing leads will extend northward towards the Murray river. The productive area practically reaches the place where the rock formations dip underneath the Murray plains. At present the great Loddon lead has been traced by boring as far north as Newbridge, about 70 miles north of the divide and about 25 miles north of the shaft of the Loddon Valley Goldfields, Ltd., while the present Loddon river joins the Murray, 75 miles further north. The Rutherglen lead, situated much further eastward, will apparently cross into New South Wales, 500 ft. below the Murray river. It is not probable that the alluvium below the Murray plains is very deep. If conditions favor, it is not impossible that the deep leads may at some time be worked further northward.



LODDON VALLEY, LOOKING TOWARDS BERRY CONSOLS.

The Cost of Mining.

By W. R. Ingalls.

There is perhaps no subject more difficult to generalize. The cost of mining varies according to conditions in a manner so obvious as to require no antithetical citations. There can be no question as to what constitutes the ultimate cost of mining, but opinions differ as to what enters into the cost during a limited or arbitrary period, such as the fiscal year; in other words, accounts are kept in various ways. Many other difficulties may be mentioned. Notwithstanding all these, it is worth while to attempt some generalizations, making due allowance for the variables, since it is only through such deductions that we obtain standards for comparison.

The determination of standards would be useful in at least three ways: (1) They would enable the mine superintendent to know if his work were being done as cheaply as it ought to be, by comparison with the cost of similar work elsewhere; (2) they would stimulate efforts to reduce expenses, since a knowledge of the cost of each part of the work indicates the direction where economy can be effected, and (3) they would furnish the engineer who has to value mines, especially new mines, with improved means of estimating the probable cost of mining, and therefore the net value of the ore. The cost of keeping accounts, even in the fullest detail, is so slight that there is no good reason why they should not be kept in a thoroughly instructive manner. The value of any accounting is greatly diminished if it be not so systematized as to give all the information that may be commercially or technically required.

At the present time there is a great lack of recorded information such as will furnish the desired guidance to the engineer. It is a frequent practice to estimate that because a certain orebody is being mined in one place at a certain cost, a supposedly similar orebody may be mined at another place at approximately the same cost. Such comparisons are useful as checks, but constitute an untrustworthy basis for estimates, unless the analogies are thoroughly demonstrated, since in the outcome it often happens that the actual cost of mining proves to be widely different from what was forecast, because of peculiarities in the particular orebody and its occurrence that had not been taken into account.

I have recently had occasion to examine several reports on a large deposit of low-grade ore occurring in a locality where there was not much mining precedent. The grade of the ore was low, and the successful exploitation of it depended upon a large tonnage being handled at a close margin of profit. It was a case where the probable cost of mining should have been estimated with the utmost precision, and by the application of engineering principles it could have been done. The mine was examined by three well-known professional men, of whom two at least had wide experience in such work. The cost of mining was estimated by one of them by a rather far-fetched analogy; the other two simply expressed the opinion that it would probably be a certain amount per ton, no reasons being given, and no references to the conditions affecting the cost. The estimates of mining and treating the ore were certainly at fault somewhere, since the mine proved unsuccessful.

If, in estimating the cost of mining, as in estimating the cost of smelting and other engineering processes, the estimate be divided into its elements—the probable cost of the various parts of the work that go to make up the total—peculiarities affecting the total cost are much more likely to receive critical attention than when a lump estimate is made without any analysis.

The presentation of a detailed estimate in a report on a mining proposition is a good deal more convincing, especially to consulting engineers, to whom the report may be submitted, than the statement of a single figure for the total, which furnishes no evidence as to its accuracy, and in many cases can be no more than pronounced "probable" or "improbable" or some other uncertain characterization. It may be suggested that, in view of the numerous reports that are circulated without any information as to the cost of mining, cost of plant, etc., which it is necessary to know about, leaving it to the investigator to determine those factors, we should be grateful for what little is sometimes offered, and so we are, but it is not that class of mining report to which I am referring in this article.

In venturing the suggestion that it is possible to forecast the probable cost of mining in a more rational manner, I feel sure of my ground, through the knowledge that there are many engineers who are not content to express inferential opinions, but analyze the various conditions that affect the cost of stoping, tramming, hoisting, timbering, pumping, etc., and that there are such technical papers as that of Kinzie on the mining and milling methods at Douglas Island, and that of MacDonald on the method and cost of mine timbering at Rossland, and many others of the same class, which go thoroughly and lucidly into the engineering conditions. We need more papers of that character, which will give information as to the unit costs under numerous and various conditions, and especially the unit requirements of labor, in hours of work, and material, in pounds, tons and other measures.

In making analyses of costs for purposes of comparison, it is essential that the basis for itemization shall be as nearly uniform as possible. Some recently published statements have permitted the following tabulation, which, though imperfect, will certainly prove suggestive:

Item.	A[1]	B[2]	C[3]
1. Miners and helpers	$0.34	$0.435	$0.429
2. Trammers, shovelers, etc	0.41	0.365	0.790
3. Drill sharpening and repairs	0.15	0.120	0.261
4. Compressed air	....	0.120	0.083
5. Maintenance of cars	0.03	0.090	0.038
6. Explosives	0.13	0.145	0.092
7. Timber	0.28	0.110	0.205
8. Timbermen	0.23	0.190	0.067
9. Hoisting	0.23	0.190	.....
10. Pumping	.....	0.035	.....
11. Supplies, n.e.s.[4]	0.04	0.040	0.105
12. Supervision[5]	0.23	0.225	?
Total	$2.07	$2.065	$2.070

[1] Cripple Creek, Colorado (reported by J. R. Finlay).
[2] Center Star mine, Rossland, B. C. (official report).
[3] Bunker Hill & Sullivan, Cœur d'Alene (official report).
[4] Including all supplies not elsewhere specified.
[5] Including bosses, assaying, surveying.

The above classification appears to me quite useful, although for thorough comparison we ought to know the rates of wages, consumption of certain material (especially coal), and prices of the principal materials. Items 1, 3, 4 and 6 give substantially the cost of breaking down the ore; items 2 and 5 the cost of loading the ore and delivering to the shaft; item 9 the cost of hoisting and delivering at the surface; items 7 and 8 the cost of supporting the ground, and item 10 the cost of keeping the mine dry. Each of these steps in the work is likely to vary rather widely in different mines. The ups and downs may offset each other and make the totals about the same, as, for example, in the above three cases, but they may not.

There are comparatively few mining companies which report their costs with the above detail. Numerous companies, however, report costs itemized as follows: 1, labor; 2, coal; 3, timber; 4, explosives; 5, other supplies; 6, supervision; 7, administration and general expense. Such a statement is useful, but it is more useful if the items are subdivided according to the various branches of the work.

In considering the comparative cost of mining, the following are some of the essential conditions determining the result which it is necessary to take into account:

1. Size and character of the ore deposit.

2. Method of mining, (a) open cast, (b) underground. If the latter, whether room-and-pillar system, caving, filling, timbering, or a combination of two or more. The proportion of the orebody extracted is an important consideration. The system of breaking the ground, the lay-out of the mine, the method of handling the ore, drainage, etc., are determining factors.

3. Depth and longitudinal extent of the workings. Increase in depth increases the cost of hoisting and pumping; increase in longitudinal or lateral directions increases the cost of tramming.

4. Character and amount of necessary development work; *i.e.*, the work that must be done to discover and give access

to the ore. The amount of "dead work" that is required is one of the greatest causes of variation in the cost of mining.

5. Quantity of water to be raised from the mine and the depth from which it must be lifted.

6. Quantity of coal, dynamite, timber, steel, etc., consumed per ton of ore.

7. Wages of labor of various kinds and its quality.

8. Cost per ton of coal and its quality.

9. Cost per pound of dynamite (various grades).

10. Cost of timber per 1,000 ft., board measure.

11. Tons of ore mined per annum; tons of shipping product sorted out; tons of waste raised.

12. Supervision and administration.

The conditions which are most closely comparable are those of large orebodies, of which the whole, or nearly the whole, is extracted and sent to the mill, as, for example, those of Ducktown, in Tennessee; Flat River, in Missouri; Homestake, in South Dakota, and the copper mines of Lake Superior. In the case of narrower veins, like those of Cripple Creek, comparison can be made only by considering as the ore all the material that has to be taken out; but inasmuch as it is seldom profitable to take out more than enough to afford working room, the costs in such mines are necessarily higher than in those wherein large faces of ore can be worked in great chambers. The lowest cost of mining ought theoretically to be experienced in large deposits of ore that can be entirely extracted as suitable for milling or smelting, and can be opened by drifts of large size.

Considered commercially—and, after all, mining is simply a commercial business—the true cost of mining is $X - Y = A$, in which A is the maximum profit realizable from the mine, X the market value of the ore, and Y the cost of mining, including all outlay for plant and development work; but it is only in rare cases that advance estimates can be reduced to these elements. However, the cost of getting to the ore and the cost of plant for its extraction are certainly factors in the cost of mining, which leads to the much-discussed question as to how the expense for new construction, and great developments, like new shafts or adits, should be charged in annual statements of mining costs.

It should be recognized clearly that any useful comparison of costs can be made only in the light of analysis of all the determining conditions. The cost of mining at one place may be $3 per ton, and at another place only $2, yet the better work may really be done at the former. In itemizing the various elements of cost, such as breaking ground, shoveling and tramming, explosives, timbering, pumping, etc., and comparing them, we shall arrive closer to the actual results, but we shall fail to get at the truth unless we consider the proportion of the orebody ultimately won and the final profit in its extraction. Mr. J. R. Finlay expresses this principle so clearly in discussing the cost of mining at Cripple Creek, Colorado,[1] that it is useful to repeat some of his remarks. He says: "A low cost per ton, either of crude rock hoisted or of sorted ore shipped, does not necessarily indicate either good mining or good management, and is nearly as apt to indicate the contrary. Two mines may be working in exactly the same kind of ore, and one may ship ore at more than twice the cost for mining that the other does, and yet be doing better work and making larger profits.

"At Cripple Creek the ore occurs in a multitude of small veins, either single or in aggregates. In the small seams which constitute either the vein itself or a component part of it, the ore is rich, but the rock on the walls, or between the seams, is either wholly or partly waste. The rich seams may vary in thickness from a mere crack to a foot or two, and for these widths may carry from one to several hundred ounces gold per ton.

"There are no large orebodies in Cripple Creek. It is doubtful if any single orebody, or even any single vein, has produced 100,000 tons of shipping ore. The largest and best veins have been found in the granite, where the rock-walls themselves are sometimes uniformly impregnated with values for a width of 30 or 40 ft. In such places large amounts of clean ore have been mined and shipped without sorting, but only in the swells; when the vein narrows down it is always necessary to break some waste in order to make room to work.

"The ore, therefore, is mined from veins of such a character that it is impossible to get it out without mixing with some worthless rock. The problem of handling this ore economically depends on the cost of treatment. This cost is at present—and is likely to be always—so high that it becomes very essential to throw out as much waste, or low-grade ore, as possible before shipping. Could the ore be treated for a dollar or two a ton, the proposition would be entirely different."

The ore shipped from Cripple Creek is a concentrate produced by hand sorting. Numerous mines in other districts are operated under similar conditions. Even at Lake Superior a considerable proportion of barren and lean rock is sorted out of the rock hoisted, in order to effect a preliminary concentration of the ore before sending it to the stamp mills. This leads to a consideration of the point where mining leaves off and ore-dressing begins. Probably there will be no disagreement that sorting practiced on the surface is technically a process of ore-dressing, but sorting is also done underground, and while that might also be technically considered a process of ore-dressing, it would be highly impracticable in bookkeeping to distinguish between it and mining.

These features indicate some of the difficulties in reducing the cost of mining under various conditions to any sound basis of comparison. Unquestionably, however, an analysis of the elements of cost would bring us nearer to such a basis, and an examination of the costs, as officially reported by various mining companies, will show the desirability of such an analysis. It is, for example, difficult for any one not familiar with the special conditions to understand why the cost of extracting a ton of ore from a great, well-equipped mine like the Anaconda should be $3.50 per ton, when ore is mined for $2 per ton at Cripple Creek, Colo. Any one examining the reports of the Lake Superior copper companies is naturally led to inquire why the cost of mining in the Atlantic is only 90c. per ton, and in some other mines of the same district twice as much. Another interesting question would naturally arise as to why mining can be done with insignificant equipment so cheaply as it has been in the Joplin district of Missouri. It is hoped that a discussion of these questions and others of the same character will be taken up in further contributions.

[1] The Engineering and Mining Journal, November, 21, 1903.

British Mining Machinery Trade.

The exports of mining machinery from the United Kingdom during the year 1904 were valued at £873,221, as compared with £781,773 in the previous year. The value of the exports to South Africa was £331,540, a decrease of £27,526 from the shipments during 1903, but great increases were recorded in exports to Europe, Australia, South America and the East Indies, amounting to 60 and 76% respectively in the cases of the first two mentioned continents. Shipments to the United States decreased to £1,493, about one-half the value for the preceding year.

Imports during 1904 were valued at £29,116 as compared with £54,302 in the previous year.

'Platinoid,' mainly a nickel-copper alloy, owes to the presence of a little tungsten its peculiar property of having a high electrical resistance which does not change with temperature.

The critical point is that temperature above which no pressure short of 'infinity' can reduce any given substance from the gaseous to the liquid condition. The critical temperature of carbon dioxide is 32.5° C. Below its critical temperature, pressure can reduce the particular substance from gas (or vapor) to liquid. Thus Faraday succeeded with ammonia, sulphur dioxide, etc.; but he failed with hydrogen, oxygen, nitrogen, and carbon monoxide because he worked under conditions above their respective critical temperatures.

The Mesabi Iron Ore Range.—V.

By Dwight E. Woodbridge.

Exploration on the Mesabi range has been, to a certain extent, a matter of chance, for, as has been said, there are few exposures showing the rocks. But there have been certain surface indications that had their effect in determining work. If the concentration of ore deposits was dependent on a circulation of underground waters and leached out a portion of the iron-bearing formation, and along structural synclines, there was to be expected a subsidence of the surface itself. Therefore many explorers worked in depressions, and found ore, though not always. In many cases later drift covering has tended to obscure original depressions; still they are usually observable. Being confined to that portion of the iron formation not covered by the slate, the elevation of workable deposits must have been, as shown by C. K. Leith in his 'Mesabi Range Monograph,' page 297, "between 1,450 and 1,750 ft. above the sea. Most of the iron formation north of the slate is between these elevations." Indeed explorers have found that the 1,500-ft. contour line will almost touch the ore surface of most of the valuable deposits of the range. This is not a hard and fast rule, but it is so general that it has been recognized by explorers, and they have followed this contour to an important extent. Then again, the ore so far found has been between certain well defined limits, not only north and south, as shown above, but east and west. "East of Mesaba station the oxide is largely magnetite," says Mr. Leith, as above, page 295, "and the associated rocks are actinolitic, gruneritic, slaty, and crystalline. Magnetite with such associations has not been found in workable deposits, either in the Mesabi district or in the Penokee-Gogebic, and if the explanation of the origin of magnetites given" (in this monograph) "is correct, there is reason to believe that no large deposits of ore will be found in this area." So far the results of exploration have checked up this theory, and the general consensus of opinion is, that it is useless to explore in that area. The westernmost limit of ore so far found is in Range 25 west, or near the Mississippi river. It is certain that the iron formation extends further west, but is deeply covered by glacial drift. Thus the limits within which exploration is carried on, and the most likely spots inside those limits, have been recognized. It was estimated by Mr. Leith that about 5% of the area of the iron formation in the entire district, as limited above, is underlain by iron ore, while for the more central area, between Mesaba station and the Hawkins mine, that is, from section 21, T 59, R 14 to section 31, T 57, R 22, iron ore underlies more than 8% of the surface. The continuance of explorations since the publication of Leith's monograph has increased these percentages somewhat, probably to 8% instead of 5, and added a little to the proportion in the central part.

OLIVER MINE IN 1904.

Early in 1903 there was more activity in exploration than during any other period, before or since. More than 250 drills were at work, and probably 1,000 men were employed in their operation. Several large exploring companies, with competent staffs of civil and mining engineers, geologists, surveyors and the like, were engaged in the work as contractors. These contractors sometimes took entire charge of the work, even to locating holes and deciding as to their abandonment or continuance. There are no records that the confidence thus placed in them was ever abused, though the opportunity has been frequent and the rewards might have been vast. Mr. E. J. Longyear had at that time more than 100 drills in constant operation; most of these were of the churn variety. The firm of Cole & McDonald had nearly as many, but were more specialized in deeper diamond drilling than any other firm. Other companies and individuals carried on drilling under contract, while a number of mining concerns did their own work. Tripods and drill-rings were to be seen through the underbrush thickly doting the ground, especially in the more productive portions of the range.

Earlier explorations had been confined almost entirely to pit sinking and the district was spotted by holes, more or less shallow, as the water level was near or far. These holes had been bored in looking for ore above the chert, and it used to be a portion of the agreement with contractors that they should be obliged to sink into 'taconite' not more than a few inches, as rock was supposed to be the bottom of possible ore concentration. With the advent of drills this idea was discarded and deeper holes were drilled through the hard chert. Occasionally in early days well-drilling rigs were used, or spring-poles and jumpers. Necessarily under such crude conditions, no great depth in hard ground could be attained.

With the growth of knowledge of geological conditions and the advent of financially stronger exploring syndicates, churn and diamond drilling took the place of more primitive work. Test pitting was relegated to its place as a mere adjunct to the main operation, and pits were not carried deeper than necessary to supply abundant water for the drills.

The churn drill is a Mesabi development, from conditions existing there. It consists of a chisel bit attached to a hollow rod, which is extensible to any desired length by simply screwing on additional sections. A flexible coupling attaches the upper end of the hollow rod to a pump, usually a No. 5 Cameron, and this drives water down the rod and out

of the perforation at the bit. This water returns to surface inside of casing, clearing the bit of choppings and bringing them to surface. The casing is pipe of from 2 to 3 in. diameter, according to the depth of the hole and the character of the material through which the drill is passing. An oscillating engine of 6 or 7 horsepower is used, and the churn motion of the drill is given by passing a rope two or three times around the drum, and pulling the rope tight or easing it off. The drill bit is rotated in the hole by hand, a man seating himself in the top hamper for this purpose. This drill is built by several local foundries and costs, complete, about $750, with engine pump and a 36 by 84-in. upright boiler that can be hauled through the woods on skids.

Such a drill drives its bit very rapidly through surface or soft ore, but is of less avail in chert or boulders. I have known a drill to work two weeks on a bit of shelving chert trying to break off a surface on which the diamonds could get hold, and in all that time to make only an inch or two. Then again they will drive down 30 or 40 ft. a day. When boulders are encountered they are blasted out by dynamite, small sticks of which are let down the hole and fired after the casing pipe has been drawn up out of the way. Often it is necessary to break out the hole by dynamite in order to drive down the casing. If in ore of uniform grade and texture it is not necessary that the casing shall follow the bit closely, but where there are sandy seams, or where grades change rapidly, the casing is kept close to the bottom of the hole. As the grade of ore driven through is determined by the sludge that washes out of the hole with ascending water, the utmost care is necessary that no enlargement of the hole at bottom be permitted. A sandy seam would drop the iron content of the ore to an extent that might make it appear valueless, while the contrary might be true, if in a different formation.

In chert, or the harder forms of slate, or some boulders, it has always been necessary to swing in the diamonds, and use the diamond drill in place of the churn. The Sullivan drill is almost universal. Sometimes the outfit is a special machine, sometimes it is a "Bravo," type "M," or other hand-machine connected to the churn engine by a belt. For a time these latter outfits were in considerable favor, for they were portable and cheap, and one would serve several churn drills, but the churn engine was not delicate enough in the hands of most runners, and the loss of carbons was considerable. In diamond drilling the most acceptable machine for Mesabi work is the Sullivan "S" or "SS," good for 500 ft. or more, and with "E" rods that give a hole about 1 9-16 in. and a core about 15-16 in. diameter. These sizes are approximate, as the setting of carbons may be such as to enlarge the hole or diminish the core. Such a drill, with parts, extra rods, boiler and pump, will cost about $1,750, depending somewhat on the length on rods furnished; and the carbons about $50 to $55 a carat. Fourteen to fifteen carats in six or seven stones, are used in a bit, and a double lot is required, so that one may be set while the other is boring. There is always danger of a lost bit, and it may take anywhere from a few minutes to months to fish it out of the hole, if it is not lost altogether. In the case of shallow Mesabi work, a lost bit is unusual, but there are mines and explorations on other ranges that are planted with bits, worth anywhere from $1,500 to $2,500 each, which cannot be regained. A few months ago a set of stones was lost in a deep hole on the Vermilion range and was recovered only after eight weeks of fishing in the 2-in. hole, 1,000 ft. deep. The bit in question had broken off in a vug in the formation and had fallen to one side, so that it could not be grasped, and when it was finally grabbed the end of the broken piece would hit the upper side of the cavity and could not be lifted out. Drill runners grow wonderfully expert at this sort of thing.

Much of the chert formation is quite broken and drilling in it is hard on stones. They are re-set frequently, sometimes several times a day, and examination is made with great regularity. If properly set, and not lost nor broken, a carbon will last a long time, and the charge for abrasion is slight. In fairly good jasper or chert a drill will bore four to five feet per day, but often makes only half as much. The charge for drilling is quite regular, $3 per foot in ore and surface and $6 in rock. At this price there is a good profit to the operator, as a rule, though occasionally a few feet will wipe out the profit from several good holes. Carbons are selected with great care, as on their permanence and cutting qualities the success of the work depends, in great measure. None but an expert can select them, as there is great divergence in quality and there are some tricks in the carbon trade as well as in others. Stones have been bought whose pitted surface was filled with a fine cement, and others have been painted to give the luster and metallic appearance indicative of hardness and strength. Reputable dealers, however, are to be depended upon. It takes the very best grade of stones for the Minnesota rocks.

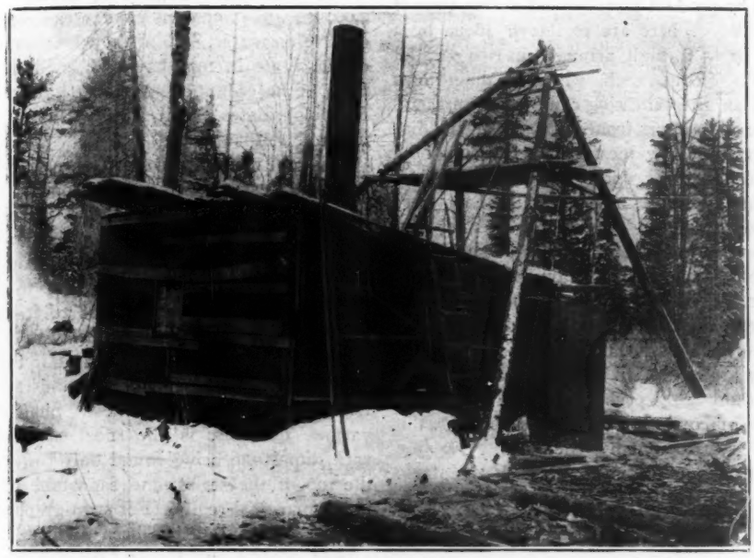
Sludge from drills is passed from the top of the rod into a series of boxes in which the solid matter is deposited as sediment. Practice has shown that not enough care was formerly exercised in saving all the particles of iron oxide, silica and the like, and the series of boxes or tubs through which the sludge passes has been extended and more slackwater space is provided. In certain kinds of rock this is a point that cannot be too carefully dwelt upon. The sludge is saved for 5-ft. sections by some parties, and for some kinds of rock in lesser intervals, and assayed, usually only for iron and phosphorus, sometimes for alumina, manganese and silica, and occasionally for a full determination. With its assay results the drill-hole becomes, for all intents and purposes, a level record of the ground penetrated, and it is necessary only to plot the series of holes in an orebody to some recognized and permanent base, to have an accurate record that places the deposit plainly before the intending mine operator. It is just this thing that has been taken advantage of by the Oliver Iron Mining Company in its Mesabi operations, and has differentiated its developments there from those of many others. This interpretation of drill records has revolutionized the manner of opening Mesabi mines for the Oliver Company and is worthy a special description.

Two or three years ago a desire arose for deep drilling, and holes hundreds of feet deep were driven through hard rock in the hope of finding ore beneath. Some have been successful, but the great majority have been useless, and it is now accepted that deep drilling is an expense usually out of proportion to results. The idea that the entire Mesabi would have to be re-drilled at depth, which obtained a few years ago, is now generally abandoned.

Chert varies through a wide range of chemical proportions and physical characters. Experience in drilling leads the explorer to differentiate between classes of iron formation rock that may be worth drilling to depth, or are not associated with ore, in his judgment. In general it may be said that a ferruginous chert of rather a loose texture is a better indication than one that is hard and dense. This is natural in view of the accepted theories of ore concentration. A gray chert, one banded with iron oxide, a yellowish limonitic chert, one of whitish color and showing the action of leaching waters, with the greenalite granules of the rock merely as a suggestion of the past, a broken irony rock, are all better in the eyes of the explorer than a chert of jaspery and unaltered appearance, of contorted structure, a chert associated with quartzite, a dense greenalite with its granules in a chert matrix, or a slate-banded iron formation rock.

These cherts pass from rocks consisting almost entirely of silica to those largely of iron oxide and every variety of intermediates, with greatly varying quantities of associated minerals, and it is sometimes hard to classify them. The line between a chert and a slate, for example, is sometimes so ill defined, that either a microscopic slide or the discovery of iron ore below the rock in question is sometimes necessary to determine its true character. Many a blue-print map may be returned from the office of the drill contractor with the bottom of a hole marked 'slate' that the following month, by reason of develop-

ments beneath, was classed as 'slaty taconite,' and still later as 'taconite.' It is, at best, hard to classify a rock not plainly characteristic, by the core from a drill-hole. Analyses of these cherts made by Leith, and given in his 'Monograph," previously quoted, on page 139, run from as high as 80% SiO_2 to 46% Fe. In this connection it is interesting to note that one or two companies have been mining this chert and shipping it to their associated furnaces, where it has been found of good value, as an aid in the reduction of iron ore. There is little question that there are large quantities of taconite that will ultimately be shipped and put through furnaces with economically successful results.



DRILL SHANTY FOR WINTER WORK.

Usually the unit of ground for exploration is the 40-acre tract, the smallest regular government subdivision. This is divided off into squares of 300 ft. and holes are drilled at the corners of these squares. Sometimes only four or five holes will be put on a 40-acre tract, which should be, but rarely is, 1,320 ft. square; again the drilling will be at 100-ft. intervals, all according to the degree of thoroughness desired and the forwardness of preliminary preparations. The tendency now is toward closer drilling, and many an orebody may be found that has been skipped in earlier work. Orebodies usually feather out to a thin edge, but this is not always the case, and a hole may be 25 ft. from a good deposit 100 ft. thick. I recollect one case where the expenditure of $40,000 by explorers, in the early days of the range, failed to find anything, and a second drilling consumed $10,000 or $15,000 more, without avail; but a third did find nearly a million tons of 62% bessemer ore, running to within a few feet of both sets of prior holes. And it was the study of conditions that found, and the ignorance of them that escaped, this good body of high-grade ore.

As the value of the drill as a means of finding ore varies inversely as the worth per ton of the material sought—in other words, as the drill is of greater moment in searching for a large body of low-grade widely disseminated ore, than in looking for irregularly distributed high-grade bodies—it is of especial value on Lake Superior, and has been utilized to the utmost. The region has been a school from which expert drill-men have gone to all parts of the world where a knowledge of the hidden portions of the earth are desired, and Lake graduates are to be found from Panama to Sweden, and from South Africa and Australia and New Zealand to California and Alaska and the Caucasus. On the Mesabi range, on account of the relatively shallow holes driven, the drift, or curvature of holes, so manifest in deep workings, is absent, and the rather disconcerting occurrence of a bit coming out above ground and revolving vacantly in the air a thousand feet from its machine, is never seen.

OLIVER MINE IN 1892

Calcium Carbide as an Explosive.

According to M. P. S. Guédras (*Comptes Rendus,* 1904), calcium carbide is introduced into a metallic cartridge, separated by a diaphragm from the necessary water for its decomposition; the cartridge also contains an air-space and a cavity having a detonator. The cartridge is introduced into the bore-hole, which is tamped with a wooden plug, and by striking a projecting rod the diaphragm is pierced. After 5 minutes the cartridge is exploded by firing the detonator. The rock is shattered, but not projected, and can be easily hewn with a pick. The charge of carbide is 50 grams.

False logic, disguised under specious phraseology, too often gains the assent of the unthinking multitude, disseminating far and wide the seeds of prejudice and error. Truisms pass current, and wear the semblance of profound wisdom, when dressed in imposing phrases.

Lamp-Black Oil Coke.

By Robert Schorr.

Since the discovery of oil in California, coal has been almost entirely replaced by it in the making of gas for illuminating and power purposes. While the process is rather inefficient, the low cost of oil at the present time permits gas to be made far more cheaply than from high-priced imported coals. The most efficient generator-unit uses now seven gal. of oil per 1,000 cu. ft. of gas; and an additional 2 to 2½ gal. are required for the necessary steam supply. The oil used here is a heavy (12° to 14° Baumé) Kern river product generating 19,000 B.t.u. per lb.; while the resulting gas averages 600 B.t.u. per cu. ft. So, 9.5 by 8 by 19,000 = 1,444,000 B.t.u. expended in making 1,000 cu. ft. of gas which contain 600,000 B.t.u. This corresponds with an ultimate efficiency of over 41%; while the efficiency of the gas-unit proper is over 56%. The losses, outside of the boiler plant, are due to radiation and to the making of oil-tar and lamp-black as waste products. It is the object of this paper to illustrate the economic importance of the lamp-black.

In one of the largest local gas works, for every 1,000 cu. ft. of gas, there is produced 12 lb. of lamp-black (dry). The lamp-black, dry, has a heat value of 8,100 cal. per kg., or 14,580 B.t.u. per lb.; consequently the 12 lb. represents a loss of 174,960 B.t.u., or 12.1% of all heat expended. On these data, one ton of dry lamp-black corresponds to 3.4 barrels of oil; and, at $0.60 per barrel, its value to the company foots up $2.04. The oil-tar present in the lamp-black is not taken into consideration. These figures illustrate the importance of this product; and great efforts are being made by gas-engineers in the following directions: (1) to reduce the amount of lamp-black to a minimum; (2) to use it in the gas process itself; (3) to produce a good fuel by briquetting; and (4) to agglomerate it by the addition of oil or oil-residues into a merchantable coke.

Commercial success in any of these directions will be governed by local conditions. In some places, it may pay to run the gas-units at a high temperature, thus making a great deal of lamp-black. The California Gas & Electric Corporation, after consulting regarding the advisability of briquetting, gave the order to design a coke-oven for its Station-B gas-works at Oakland.

The oven was started two months ago, and is running steadily on lamp-black containing over 60% of water. The scrubber-water and oil-tar discharge into settling boxes (30 by 100 ft.), where a portion of the water is eliminated. From the settling-boxes, the lamp-black is raised by means of derricks and clam-shell buckets, and dumped near the coke-oven. Assuming only 50% of water remaining, 24 tons of semi-wet lamp-black accumulate in producing 2,000,000 cu. ft. of gas; and 30 tons with 2,500,000 cu. ft. The company's boilers are fired with lamp-black, part of which is sold in the neighborhood, and the balance gradually worked up into coke. The oven I designed for this purpose is of the vertical type, with a provision to attach the by-product arrangement at any time if desired. There are 10 retorts 16 in. by 4 ft., by 15 ft. high, arranged in two parallel banks of five each, with the main flues and an air-preheating canal between them. The charging is from the top; and the discharging is by means of self-tilting bottom-discharge doors. No mechanical means are necessary to get the coke out; it descends by gravity on opening the doors, and is quenched there. The lamp-black is mixed with heavy crude oil, and dumped into the retorts. The developing gases enter, through narrow slots, into the flue-systems surrounding each retort; and they are consumed there by the admission of thoroughly preheated air. The products of combustion circulate through the flue system, finally descending to the main flue, which connects with the stack. All air necessary for the combustion is drawn from the top of the oven through an auxiliary fire-box; and therefrom it enters the main air-canal which is provided with a number of baffle-plates. From this main air-canal, small ducts lead to spaces around each retort. The heat distribution is satisfactory and the coke made is dense and hard. Its pyrometric value is 18,000 B. t. u. It ignites readily and leaves hardly any ash or clinker.

During the recent heavy storms, it required three weeks to heat up, the brick-work having been exposed to 14 inches of rainfall. The lamp-black is also extremely wet; and, for that reason, the amount of oil used and the time required for coking are rather high. At present, each retort charge of 3,600 lb. uses 100 gal. of oil, and takes 36 hours for coking; at that rate over 7 tons of coke are made per day. There is no doubt that conditions will improve with better weather. A large portion of the oil now added is necessary to evaporate water. Each charge of 3,600 lb. contains 2,200 lb. of water; assuming an evaporation of 11 lb. of water per lb. of oil, this alone requires about 25 gal. of oil. The lamp-black oil coke takes up water readily.

The ordinary anemometer only shows averages of wind velocity. Langley demonstrated that in, say, a 20-mile breeze, the velocity was continually varying, roughly between 10 and 30 miles an hour.

Zinc-blende is sometimes a complex mineral. A black variety, marmatite, carries a double-sulphide of zinc and iron, the latter often amounting to 10 per cent. It is this which renders much blende magnetic, or, better, magnetiferous, a quality which is utilized in some of the recent separators.

The Coalfields of Missouri.*

By B. F. Bush.

The coal measures of Missouri are found underlying parts of 57 counties in the northern and western portions of the State. Of their total area, 23,000 sq. miles, only 2,000 sq. miles contain commercially productive measures, 80% of the whole output of the State in 1903 having been derived from nine counties—Macon, Lafayette, Randolph, Bates, Adair, Roy, Vernon, Barton and Putnam.

The coal measures are of Carboniferous age, and rest unconformably upon rocks of the Mississippian series, but in some localities upon Devonian and Silurian rocks. From their outcrops in the southeastern margin of the field, they dip to the northwest at a grade of about 10 ft. per mile, reaching a maximum thickness estimated[1] at 1,900 ft. The coal seams, in their fullest development, number 29, and range from 1 in. to 5 ft. in thickness. Shale, of various qualities, is the most abundant rock, limestone being found only towards the top of the series, and sandstone only in the marginal region. For stratigraphical reasons, the system has been divided into Lower, Middle and Upper Coal measures.

The Lower measures are those below the Mahoning sandstone and contain no limestone. Of their eight coal horizons, two only are productive, and on a small scale, although it is these Lower measures that contain all the coal in Arkansas and the Indian Territory, and also the Big Muddy coal of Illinois.

The Middle measures lie between the Mahoning sandstone and the Bethany Falls limestone, and contain 12 coal horizons, from the lower four of which comes nearly the whole output of the State. Excepting the second horizon, each coal seam is capped by an argillaceous limestone. The Upper measures, lying below the Quitman limestone, contain nine unproductive seams.

Mining has been confined to the margin of the coal area, where the seams are near the surface. These sources are nearly exhausted, but it is doubtful whether, with the present abundant supply of better coal from neighboring States, the deeper and thinner seams on the interior can be exploited profitably.

Of the several fields, the Bevier, lying north of Jefferson City, is by far the most productive, being mined on a large scale at Huntsville, Ardmore and Keota. The seam varies from 4 to 6 ft., and lies at an average depth of 60 ft. At Bevier it is attacked by shafts, but farther south, in a more hilly country, by slopes and adits. The roof is soft and requires care in propping. The coal is high in ash, but low in sulphur, and is the only coal in the State that has met successfully the competition of imports from other States.

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*Abstract from paper read before the American Institute of Mining Engineers, September, 1904.

[1] Arthur Winslow, 'Report of the Missouri Geological Survey, 1891,' p. 23.

A peculiar feature is the occurrence, just outside the margin of the coal area, of irregular, isolated pockets of coal, reaching a thickness sometimes of 75 ft. They appear to be the remnants of some now eroded field, apparently of earlier origin than the present beds. The coal is of inferior quality, but sometimes of the cannel type. It is frequently strongly impregnated with sulphides, zinc-blende having been found in it at several points.

The room-and-pillar method is the one most commonly employed, the double-entry system being required by statute. Coal is generally shot off the solid. The advancing long-wall system is applied to the thinner seams, particularly in the Lexington field, where electric cutters are used to undermine the fire-clay below the coal.

All of the Missouri coals are of low-grade bituminous nature, high in ash and sulphur. They are soft and friable, and deteriorate rapidly upon exposure, or when handled. Their chief utility is for steam and domestic purposes. The highest production was recorded in 1903—4,265,328 tons.

The Size of Crystals.

By Charles S. Palmer.

The announcement of the recent discovery of the largest diamond on record is a reminder that crystal growth still has its surprises. A carat weighs 3 1-5 grains troy; and the stone weighs 3,030 carats, or 628 grams, or considerably over a pound; the repetition of the figures is worth while to fix the size clearly in one's apprehension. Report says that it is of the size of an average man's fist, and a noted gem expert is quoted to the effect that it is like two teacups, joined mouth to mouth. Certainly it is a pretty size in the rough, whatever it may prove in the cutting. From the standpoint of dimension, the stone is to be compared only with the giants of other species, such as the Acworth beryl, the quartz at Naples, or the spodumene of South Dakota.

The query arises whether there is a limit to the size of crystals, and this query is particularly pertinent just now when the press is busy reviewing an authority who draws largely on some supposed limitation in the size of crystals. In his recently translated book, 'The Wonders of Life,' Ernst H. Haeckel strenuously—and rather presumingly—lays it down as a law, because small crystals grow on larger ones of the same species and in the same solution, that therefore there is a limit to size in crystal growth. It would be interesting to know where Prof. Haeckel learned of this law. What little observation is available teaches that, given time enough, the small crystals are food for the larger ones, which may expand their size indefinitely. Indeed the surface of a crystal, whether whole or broken, seems to consist of a sheet of exactly orientated molecules which stand, inviting further addition of other similar molecules on themselves as a foundation, and so on *ad infinitum*. There is no *a priori* reason for a limit in growth by addition, and none has been observed, other than that naturally dependent on limited supply of material and limited time for nice molecular deposition. Prof. Haeckel, the learned but disputatious, should bethink himself before he builds a system of philosophy on any such taken-for-granted assumption; but his mistake has served to call attention to a phase of molecular cohesion which is worthy of much study. A crystal has no geometrical center, in the sense that a beginner conceives it from the study of symmetrical models. It requires only a few slices for optical and microscopic examination to show that it is direction, not distance from a hypothetical center, that determines the polariscopic and other related properties. Thus the natural tabular crystal of wolframite makes a perfect illustration for demonstration of uniaxial rings and crosses; sliding of this natural slice parallel with the plane of the stage of the microscope causes no displacement of the optical figure; it is apparent that any part of it, as observed, is a center of optical symmetry. Hence in molecular arrangement, the side of a crystal is as much the center of internal crystallographic structure, as is the apparent geometrical center. Or, in other words, the edge of a crystal is like a brick wall; it will carry as many more courses of brick as Nature's journeymen can build on, with the time and material at their disposal. There is, then, no limit to the possible size of crystals.

Over 7,000 highly paid artisans in the Netherlands are employed in cleaning, cutting and polishing diamonds for the United States market. All this labor might be diverted to the American market by importing the stones direct.

A Complicated Fault-System.

By H. C. Bacorn.

The A. D. & M. mines, situated at Gibbonsville, Idaho, present a complicated series of faults, and a brief description of their occurrence and the method pursued in solving the problems incidental to them may be of interest.

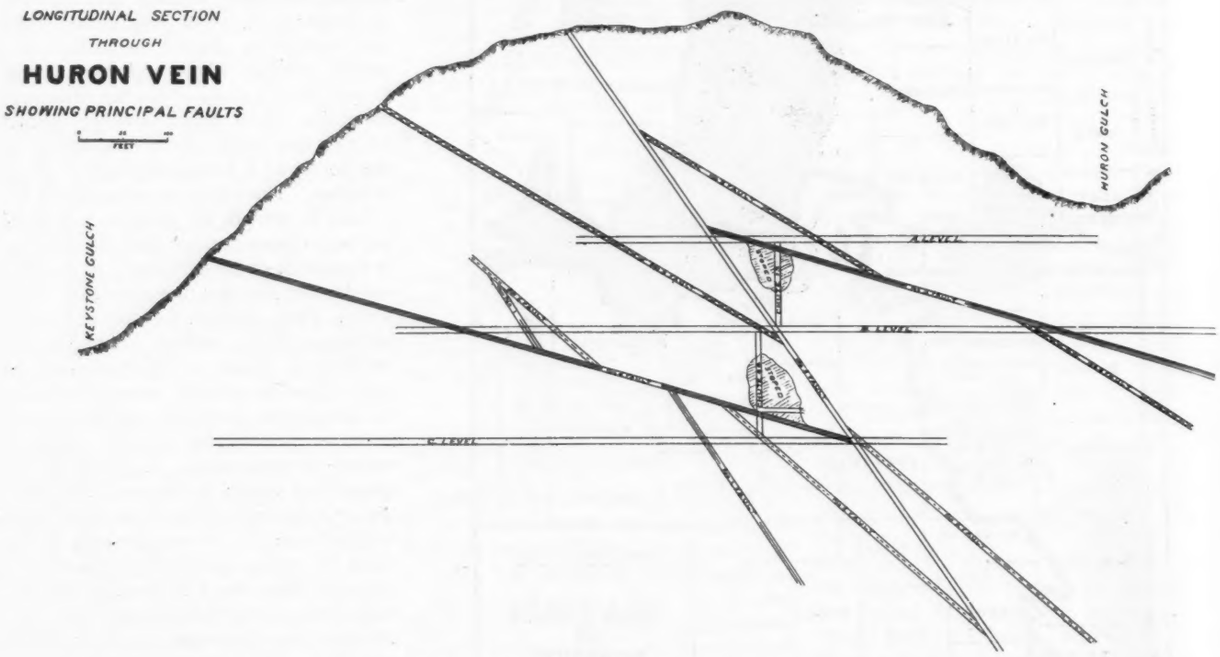
There is a series of parallel veins in this property, occurring in clay slate, with a general strike of N. 70° W., and a dip 80° north, cutting the slate beds at right angles to their strike and parallel to their dip. These veins are cut and displaced by numerous post-mineral faults, both normal and reverse, some following and some cutting through the bedding planes of the slate. Their general strike is northerly and southerly, or approximately parallel to the strike of the slate, and at right angles to the course of the vein.

In the Huron mine, the faults, with one exception, are reverse or upthrust faults, and the accompanying longitudinal section shows only those causing the greatest displacement; the others, having a lateral displacement of a few feet down to a few inches, are mostly check-faults due to the movement along the greater fault-planes. In one raise of 25 ft. fifteen of these small check-faults were encountered, each causing a slight displacement to the north with the accompanying upthrust to the west. Many of the faults intersect and throw other faults, and their combined effect had to be considered in locating the final resting places of the dislocated sections of the vein.

The path of movement has been upward rather than sidewise, and the section, looking northerly, shows the upthrust only, the average throw to the north, not shown, being about 15 ft. The ore occurred in irregular bunches in the vein, from one to three feet in width, and it was impossible to correlate with certainty the bunches of ore found below and above the faults; consequently the longitudinal displacement, or upthrust, was not known. As in numerous instances, good stopes of ore had been cut off by these faults, and though by simply cross-cutting to the north the vein could be recovered, it was necessary to ascertain the amount of upthrust in order to locate the continuation of the good ore above the faults without doing much unnecessary prospecting. This was accomplished by correlating the faults cut by later faults, as it was possible to recognize the different portions of the same fault by their lateral displacement, dip, etc. Platting the faults as shown by the mine workings soon indicated their relative age, as each fault necessarily displaced all previous faults with which it came in contact, as well as the vein.

As the fault marked No. 5 was found to cut through all the others, it follows that it must be the latest; all of the country east of it was thrown to the north 20 ft. and on the plane of the fault a distance upward of 300 ft. Note how the upthrust of this fault brought up the lower portion of the No. 2 fault, so that No. 2 was encountered twice on *C* level within a distance of 100 ft. Previous to the No. 5 fault-movement, the No. 4 fault was continuous and had cut No. 3 fault, causing a displacement of 16 ft. to the north and an upthrust of 150 ft.; and so on, down to No. 1, the oldest post-mineral fault encountered.

As an illustration of the value of this map the faulting of one stope of ore is shown. A good stope was opened up and worked through chute 15 from *B* level until it was cut off by No. 4 fault, the vein being barren where cross-cut above the fault. The continuation of this ore was found in chute 44 from *C* level almost vertically below the original lower portion, their positions having been reversed. This may be more clearly seen by making a tracing of the faults and of the two stopes shown, and reversing the fault movement by cutting along the fault lines, commencing with No. 5 and sliding the right part downward until the severed portions of No. 4 fault are united. Then cut along No. 4 fault and slide the upper portion downward to the right until the severed portions of No. 3 fault are united and the original position of the faulted orebody is shown.



Although some discrepancies were found in the original fault map, probably due to inaccuracies in platting the faults in the more or less inaccessible old workings, it is remarkable how closely it checked.

Only experience with each definite grade of steel will enable the tool-maker to produce tools of that even grain and velvety appearance that is prized.

Do not condemn a particular grade of steel recommended for a special use, until you are sure that you understand how to heat and anneal or temper that particular grade.

Metallic electrolytic calcium is now quoted at $1.50 per lb. in 200 lb. lots. It is in the form of rough rods, which externally, are said to resemble 'cabbage-stalks,' but which show a bright metallic surface on a fresh cut. These rods are 97 per cent fine, the difference being made up of calcium chloride and metallic sodium.

The Simpkins Laboratory at Harvard.

By George S. Raymer

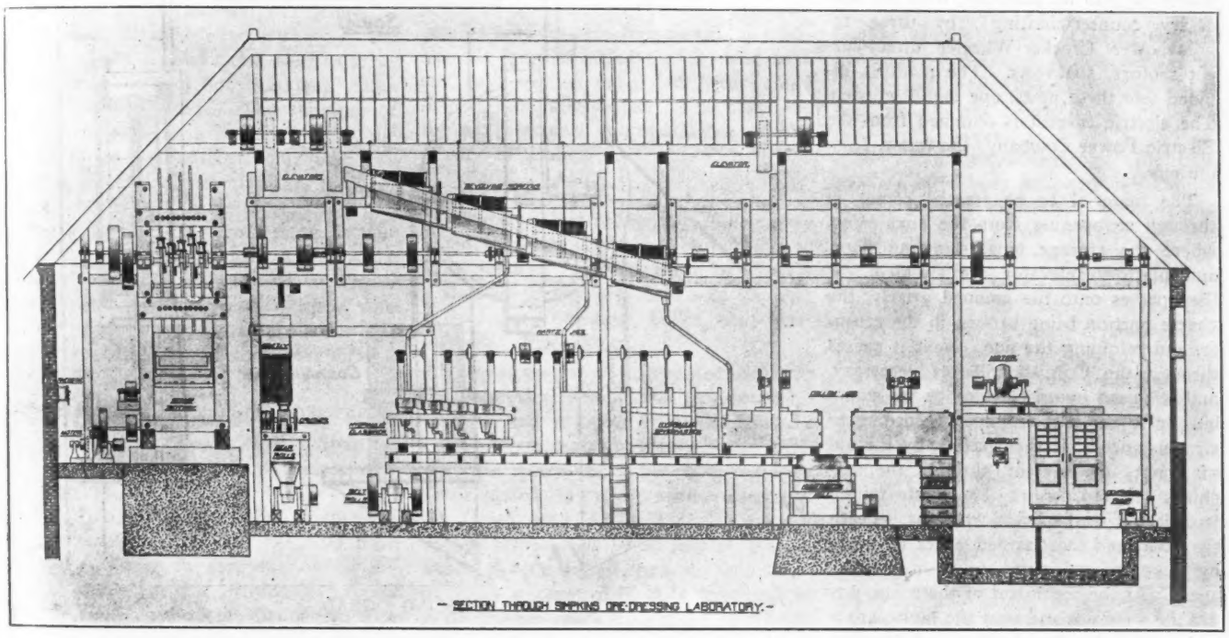
The Simpkins laboratory was designed to afford students an opportunity for the study of continuous milling operations on a considerable scale; otherwise, they might have no knowledge of actual practice, a misfortune to those who are so situated financially that they must secure working positions immediately after graduation. The mastering of the detail of machines, and the solution of problems that occur in mills, are long processes, and cannot be commenced too soon. It requires, also, more personal instruction than most mill-foremen can be expected to give. A laboratory consisting of standard-size machines, and permitting the dressing of ores in quantity, should enable the student to obtain this instruction early in his career, and should also fit him for more rapid promotion subsequently. Even then he will also have much to learn, both in the adaptation of the apparatus to a particular ore, and also in the running of the machines themselves. A mining school is particularly adapted to such work. The different machines can be conveniently placed for the purpose of study; they can be moved about to suit different processes, and the instruction can be carried on with less interruption than in a regular mill. The machines should be so arranged that separate experiments can be made with each, on a selected portion of ore, and so that the same material can be returned by elevator and launder after remixing, to be used again. With modern automatic appliances, labor is not excessive; and the student is able, from his own experience, to learn something of what may be expected in actual practice. Such a plant for heavy work, when supplemented by the usual desk-apparatus, such as glass classifiers, experimental jigs, film sizers, hand screens, pans, etc., affords an equipment suited to the solution of many of the problems of milling. The storage of the different lots of ore requires particular attention, and should be provided for in the design.

The plan adopted contemplated a laboratory which could treat a reasonable amount of ore on standard-size machines in one continuous process, carrying the different products to a finish; in this way, the weighing, mixing, sampling, assaying, crushing, rolling, stamping, screening, jigging, sorting, vanning, settling, etc., could all be performed by the students in proper order. The ore to be used is weighed, mixed, sampled and assayed by them; screen and sorting tests are made, and a suitable process decided upon. The size of the screen, water current velocity, jig-stroke, stamp-drop, etc., are selected. The machines are then connected in their proper order, and each student takes his turn. The change from one process to another is generally merely a matter of moving a machine or two, substituting a different screen, and rearranging pipe and launder. An abundance of these last, with plenty of elevators, enable one to vary the process to meet almost any conditions.

The plant, shown in section in the accompanying cut is installed in a room 80 ft. by 30 ft.; with a height in the center of 32 ft., lighted by a large skylight in the roof, and by windows at one end. The whole room is covered with a 6-in. floor of concrete, with separate foundations for the stamp battery and Huntington mill; posts support the driving shafts. Near the south end and below the floor, six settling tanks, lined with concrete, have been built, communicating with each other by overflow, the last one being connected to the drain traps.

The plant at present consists of the following machinery: Grizzly, 2 ft. by 5 ft.; taper bars, 1 in. opening; Dodge crusher, 4 in. by 6 in.; pulley roll-feeder; pair of 12.5 in. by 12 in. rolls, geared; pair of 12 in. by 12 in. rolls, belted; suspended Challenge feeder; stamp battery of five stamps, 500 lb., 6-in. drop, 90 to 100 drops per minute, Blanton cams, iron mortar, three chuck-blocks, assorted screens, silver-plated copper-back plate, and front-plate on each chuck-block. The battery frame is securely bolted upon a concrete block 6 ft. by 15 ft., 6.5 ft. high, with concrete mortar-block in the same piece, standing between the battery posts. On this block the mortar is securely bolted. This brings the floor under the battery frame 4 ft. above the main floor, and permits tailing to flow to machines on the floor below, with the interposition of an amalgam settler, tailing sampler, or classifier.

Additional apparatus comprises: Three apron-plates, 4 ft. by 4 ft. by ⅛ in. thick, silver-plated copper, set in steps on a frame with variable slope, hinged to battery posts, and wedged upon the concrete mortar-block; an amalgam trap; iron cone-classifiers; Frue vanner, 4 ft. wide, plain belt; Wilfley table, 3.5 ft. by 6.5 ft.; slime belt, rubber, 4 ft. by 10 ft., with variable side slope and travel; Evans slime-table, 12 ft. diameter, board surface; amalgamating pan, 36 in. diameter.; settler, 5 ft. diameter; clean-up pan, 19 in. diameter; three elevators, belt and bucket; set of four revolving screens, 30 in. diameter by 4 ft. long; two Hartz jigs of wood, single,



THE SIMPKINS LABORATORY AT HARVARD UNIVERSITY.

three compartments; two Collum head-jigs of wood, single, two compartments; two classifiers, one of wood with four compartments, the other, a four-compartment, earthenware, Browne hydrometric sizer; Huntington mill, 3.5 ft. diameter; No. 3 iron rotary force-pump, capacity 17 gal. per minute.

The jigs are placed on a platform raised 4 ft. above the main floor, as are also the larger classifiers. The Wilfley table, vanner, slime belt, pans, settler, and Huntington are on the main floor. A gallery extends along the western side of the room, with a bridge across to the jig floor. The machines are all of standard sizes, but as small as possible in order to economize ore. The size of the room required that the arrangement of the machinery be compact. The machines are driven from three shafts (2 7-16 in. diameter, with the necessary counter-shafting), by three 15-horsepower Crocker-Wheeler direct-current motors, 500 volts. The plant is divided into three units, one motor to each. The electric current is obtained from the Electric Power Company; the water, from the city.

The material to be treated comes in through an opening from the next room, where the storage bins, sampling floor, and platform elevator are situated. It then passes onto the inclined grizzly, the coarse portion being broken in the crusher, and rejoining the fine. Next it passes through the Cornish rolls, if necessary, and is raised by an elevator to the stamp bin, or to the first trommel, according to circumstances. It then passes, by the aid of gravity or elevator, through the machines selected for it. The waste tailing is collected in the overflow tanks beneath the floor, and the clarified water is raised by a centrifugal pump to be used over again. At the south end of the room, under the windows and near the tanks, are a table and a sink for cleaning and dressing amalgam-plates. The sink has a false-top fitted for work with classifiers, etc., water for this purpose being furnished by three constant-head tanks, with connections to accommodate three classifiers at once.

In the adjoining room is a complete assay outfit, including nine double-muffle furnaces, burning Pocahontas coal; the muffles are 10.5 in. by 21 in. by 6.5 in. A crucible furnace, sample grinder, bucking board, cupel machine, and slate desks, etc., are furnished, enabling the student to carry his determinations to their conclusion in the laboratory itself, which is a great convenience.

The electric production of aluminum, from the oxide in a bath of fused cryolite, is strictly electrolytic. This is shown by the fact that the resistance of the bath runs up as the oxide is exhausted, but falls again, with addition of more oxide. In this case, the ion theory of dissociation seems to apply to the field of fusion.

A Shaft Signaling Device.*

By E. H. Garthwaite.

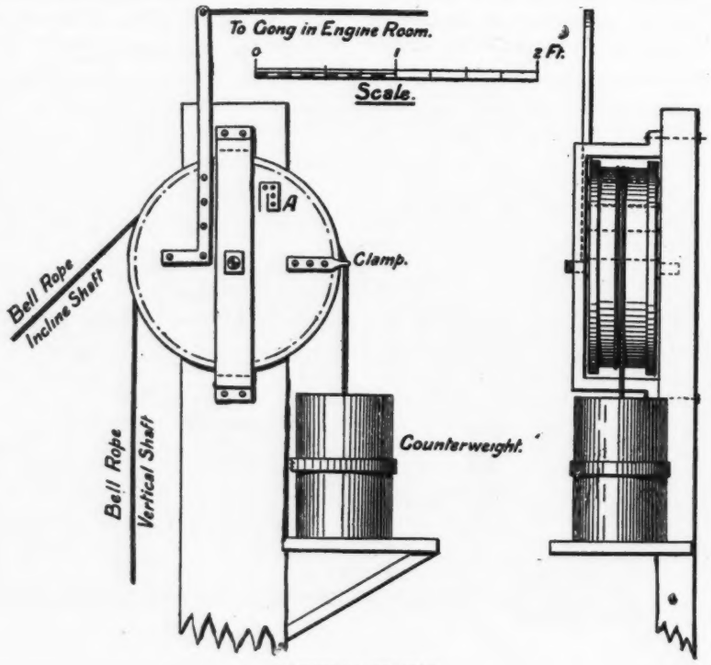
The subject of mine signals, especially for use in shaft work, is of particular interest to the mine manager. Electric and compressed air installations have proved satisfactory for the purpose of signaling, and, where properly equipped and fitted, seem to leave little to be desired. In many mines, however, mechanical devices are still used, and, in the majority of cases, they do not prove remarkably efficient, as they are generally clumsy and require a considerable amount of brute strength to work them.

The writer would like to bring before the notice of the Institution a mechanical device which he came across many years ago in Mexico, and which he has since used with great satisfaction, especially in shafts 500 to 1,000 ft. deep; the device is equally well suited for vertical or incline shafts.

The accompanying diagram shows the arrangement of this device, and it will be seen that the bell-rope from the shaft, whether vertical or inclined, winds round a drum made of wood with the sides bolted on; galvanized iron-wire rope, one-quarter inch diameter, is generally used. An L-shaped lever is bolted to one side of the drum, to one end of which is attached a rope communicating with the engine-room.

A special feature of the apparatus is the counter-weight, which consists of an iron cylinder, generally a small oil drum, which can be filled with scraps of iron, etc., so that it just counterbalances the weight of the bell-rope. This makes it possible to pull the bell-rope with slight exertion, so that if one is riding in a cage or bucket, at a medium speed, it is possible to give a signal to stop, if necessary. The counterweight rests on a bracket, and usually a guard is placed around it so as to prevent the possibility of its tipping over.

Gongs are distinctly preferable for the conveyance of shaft-signals, but, unless it is possible to treat them gently, they generally get out of order very easily. With this device, however, a gong can be satisfactorily used, for over-straining is prevented by the lug *A*, on the signal drum, which does not allow the drum to turn more than the distance between the lug and the upright iron frame. This distance is regulated by the length of pull necessary to ring the gong properly.



HOISTING SIGNAL.

Platinum is very infusible, yet it begins to volatilize in an oxygen atmosphere at 800° C. A theoretical volatile oxide would account for the phenomenon, as, also for that of 'sprouting' on cooling.

Silver can be deposited electrolytically on aluminum. This offers a large advance in the use of the light metal. The invention comes from Sheffield, England.

Certain metals stimulate and others retard the rusting of iron in aerated water; thus copper accelerates the action, while tin, lead, zinc, manganese, aluminum and magnesium, hinder it. It seems to be due not to the metal, as copper, but to an oxide as hydroxide in solution in the water. Arsenious oxide is also said to hinder, and alcohol and methyl salicylate; while sugar, phenol and resorsinol accelerate action.

* A paper read before the Institution of Mining and Metallurgy, London, Jan. 19, 1905.

Books Reviewed.

Annuaire pour le Bureau des Longitudes. 1905. Paris, France; Gauthier-Villars. Pages, 800; illustrated. Price (in New York) 50 cents.

This is a compact volume, comprising most varied and complete tabular statements of astronomic and geodetic fact. It is roughly parallel with parts of the 'Nautical Almanac,' and will be found useful to the civil engineer who must be dependent on careful terrestrial and celestial observation in adjusting his instrument to varied times and places.

Les Aciers au Nickel. By M. L. Dumas. Paris, France; Vve. Ch. Dunod. Pages, 204.

This monograph on high-grade nickel steel is essentially a reprint of papers published first in the *Annales des Mines.* It involves a detailed examination of the properties not only of nickel steel as associated with carbon, but also with chromium and manganese. The standing of this work of Dumas is indicated by the fact that he is almost the only authority quoted, on the subject of nickel steel, by Henry M. Howe, in his 'Iron, Steel and other Alloys.' The monograph is one of that limited class which may merit the title "classic"; it only remains to remind the student and the manufacturer concerned, that this work is available. Its place is assured in all complete libraries on Steel.

Oil Engines. Second Edition. By A. H. Goldingham. New York; Spon & Chamberlain. Pages, 255; illustrated. Price, $2.

The first edition, published four years ago, was unique in being the only book devoted entirely to kerosene or oil engines; and the new edition can come near to claiming the same distinction. New chapters have been added on 'Oil Engine Troubles,' 'Fuels,' with tables, and 'Miscellaneous'; also large oil and portable engines have received more extended treatment; but both, under suitable conditions, are far enough in advance of the steam engine to encourage a study to which this book contributes. The thermal efficiency of the best oil engine (18%) is low as compared with that of the best gas engine (28%). The book can be commended as a concise and reliable digest of experimentation in a field which offers great opportunity, based on partial accomplishment.

Smoke Prevention and Fuel Economy. By W. H. Booth and John B. C. Kershaw. New York; the Norman W. Henley Publishing Company. Pages, 194; illustrated. Price, $2.50.

This timely treatise is based on the German work of E. Schmatolla, but it is more than a mere translation with additional appendices. After a short introduction which is mainly historical, there are four chapters, dealing respectively with: (1) The chemistry of the combustion process; (2) present methods of burning fuels, and their defects; (3) improved methods of burning fuel; (4) the examination of the waste gases, and control of the combustion process. The appendix, comprising about one-fifth of the book, gives: (1) Abstracts of English, German, and American patents; (2) fuel analyses, losses, and costs; (3) some miscellaneous but valuable formula, and certain rules for sampling, etc. The authors believe that even bituminous coal "is capable of perfect combustion, and that black smoke is merely so much evidence of improper design." As a whole the book is a valuable contribution to a subject vital both to the manufacturer and the neighboring resident, and the careful index is further proof of the intention that this thin volume be used for reference as well as reading. It may be added that in bold type and easy spacing much has been gained in presenting the subject. The names of the authors give full guarantee of the quality of the work.

Elements of Mineralogy, Crystallography and Blowpipe Analysis. Third Edition. By Alfred J. Moses and Charles Lathrop Parsons. New York; D. Van Nostrand Company. Pages, 444; illustrated. Price, $2.50.

Mineralogy is a many-sided science; the theoretical phase leads to assembling of vast and complex manuals, such as Dana's monumental 'System'; not to mention the special lines of crystallography (represented by the German monographs of Groth, and Liebisch); or petrography, represented by Zirkel, or Rosenbusch. But many an engineer, who keeps at hand a copy of Dana's 'System,' or even of the more condensed text-book, often sighs for a summary which shall be really tangible and practical; for mineralogy, by right and reason, is and ought to be, the ever-present servant of the miner and metallurgist. Any book, therefore, that claims to offer such service in a clear, ready, helpful way, demands and receives more than casual attention. The volume before us, by Moses, of Columbia, and Parsons, of New Hampshire College, is such a book, and we shall consider it on this basis, namely, a handy summary of the main facts from the latest standpoint. It is unhampered by fine-print detail; but it gives the more important statements. It describes, or refers to, only about 600 species of minerals; but these are the most important in geology, in mining, and in metallurgy, in the broader sense. The volume is essentially a careful concentration of lecture-notes, on crystallography, geometrical and physical; on blow-pipe analysis, and on systematic mineralogy. Indeed, it is said, confidentially, that at least half a dozen of the required courses at the Columbia School of Mines are based upon this one book. This is the third edition of the text-book.

Part I, dealing with general crystallography, has been rewritten. We note with approval, the distribution of crystals on the 32-group basis, appropriately classed under the convenient fiction of the venerable 'Six Systems.' As units of comparison, the center-of-symmetry and symmetry-by-reflection are almost ignored, but the practical planes and axes of symmetry are retained. A large measure of success has evidently resulted from the attempt "to subordinate the study of models to the study of actual crystals."

The introductory portion of Part III. 'Descriptive Mineralogy,' has been carefully revised and rewritten; and here we would note with approval the free use of half-tone reproductions of actual specimens, another new and valuable feature of this edition. One of the best additions is the 15-page chapter on the 'Occurrence and Origin of Minerals'—a gem of editorial and technical condensation.

In 'Systematic Mineralogy,' the older editions have been followed in classification of the iron minerals, the copper minerals, etc. The gist of each class has been given; but, in some cases, it might have been well to elaborate a little more; on the feldspars for instance, with their physical, chemical, and crystallographic properties as dependent upon mixture of the albite and anorthite molecules, and, particularly, in view of the overwhelming importance of these ingredients of rock-formation. Time and space forbid the detailed consideration of all the material so wisely condensed. The type is clear and easy, and but few errors of proof-reading are obvious, though they do occur, as the naming of the half-tone of gold crystals on page 305, which is evidently from California, not Colorado. On the whole the book is commended without qualification—not as a substitute for Dana's 'System,' nor for Groth's 'Physikalische Crystallographie'; but rather as a short, clear, practical, and indispensable introduction to, and digest of, these.

Jahrbuch der Elektrochemie. 1902. By Heinrich Danneel. Halle-a-S., Germany; Wilhelm Knapp. Pages, 750; illustrated. Price (in New York), $8.50.

This bulky abstract of yearly progress for 1902, is the ninth of the series, founded by Nernst and Borchers and conducted by them until 1901. These year-books are edited only by the Germans; and though a bit tardy, yet this is not uselessly late, considering the mass of material to be worked over and the thoroughness with which it is done. Of the 678 pages of text proper, about 400 are devoted to the pure or theoretical, and about 270 to the applied phase of the subject. One unforgivable sin in editing is the assumption

of omniscience; it is assuring to know that the various subjects have been parceled out among ten or fifteen sub-editors, all of whom are responsible specialists; among these we note the name of Borchers over a short chapter on 'Elektromagnetische Aufbereitung' (electromagnetic concentration). It is impossible to consider this rich assemblage of fact in any detail, but it can safely be said that it is a library in itself. For busy men it is indispensable, for it is full enough to guide the seeker intelligently to the original sources, in most if not all cases. The German edition is worth many times its price as a permanent record of one year's work in a field which threatens to surpass all other departments both of metallurgy and also commercial manufacture of chemicals in general.

Books Received.

In sending books for notices, will publishers, for their own sake and that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

Etude sur les Gisements de Petrole. By Jules Demaret-Freson. Brussels, Belgium; Paul Perin. Pamphlet, 52 pages.

Inaugural Address of the Mayor of Providence. Augustus S. Miller, Mayor. Providence, R. I.; printed for the City. Pages, 44.

Gisements de Minerais de Zinc. By Jules Demaret-Freson. Brussels, Belgium; Paul Perin. Pamphlet, 26 pages; illustrated.

Les Champs de Manganese de Tomakovka, Russie. By Jules Demaret-Freson. Brussels, Belgium; Paul Perin. Pamphlet, 8 pages.

Report on the Mining Districts of Idaho for the Year 1904. Robert N. Bell, Inspector of Mines. Boise, Idaho; State Printer. Pages, 140; illustrated.

Le Procedé Manktel pour le Traitement des Minerais d'Or Argentifères. By Jules Demaret-Freson. Brussels, Belgium; Paul Perin. Pamphlet, 8 pages.

New Zealand. Inspection of Coal Mines Report. 1904. John Hayes, Inspecting Engineer, Wellington, N. Z.; Government Printers. Pages, 50; illustrated.

E'tude sur les Procedés Body, Martin et Etard pour le Traitement des Minerais d'Or. By Jules Demaret-Freson. Brussels, Belgium; Paul Perin. Pamphlet, 10 pages.

Zum Ausstande der Bergarbeiter im Ruhrbezirk. By Bergmeister Engel. Berlin, Germany; Julius Springer. Pages, 88; illustrated. Price (in New York), 20 cents.

Oklahoma. Report of the Department of Geology and Natural History. 1903-1904. A. H. Van Vleet, Territorial Geologist. Guthrie, Oklahoma; Public Printers. Pages, 52.

Twenty-fifth Annual Report of the Director of the United States Geological Survey. 1903-1904. Charles D. Walcott, Director. Washington; Government Printing Office. Pages, 388; with maps.

United States Commission of Fish and Fisheries. Investigations for the Promotion of the Oyster Industry of North Carolina. By Caswell Grave. Washington; Government Printing Office. Pages, 96; illustrated.

Map of the Republic of Bolivia. Scale 1:2,000,000. Compiled and arranged by Franz Germann. Hamburg, Germany; L. Friederichsen & Company. Four sheets, each 18½ by 25 in. Price (in New York), $7.

Commercial Relations of the United States with Foreign Countries during 1903. *Volume II.* Compiled in the Department of Commerce and Labor. Washington; Government Printing Office. Pages, 604.

Geologic Atlas of the United States. No. 114. *De Smet Folio, South Dakota.* Three map-sheets and 7 pages text. No. 116. *Asheville Folio, North Carolina and Tennessee.* Five maps and 12 pages text. Washington; Engraved and Printed by the United States Geological Survey.

Transactions of the Institution of Mining and Metallurgy. Volume XII. Edited by Sir Clement Le Neve Foster, Arthur C. Claudet and C. McDermid. London; E. & F. N. Spon, Ltd., New York; THE ENGINEERING AND MINING JOURNAL. Pages, 520; illustrated. Price, in paper, $7.50; half-morocco, $12.50.

Correspondence.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

A Personal Warning.

Sir—On August 6, 1904, one B. S. Pilzer, of this place, engaged me to go to the Minas Prietas mining district in lower Sonora, to look over some mineral land. I left with him on this occasion 500 of my letterheads, and other mining literature, but on my return only 100 were left. He absolutely refuses to give any information as to what he has done with them, but I have no doubt in my mind that he has sent letters off in my name to boom the property known as 'Las Tajos Mine.'

I will now state that never and at no time have I been in partnership with the above named party, nor have I ever written letters regarding this or any other property, whereby I have tried to induce people to invest their money in a scheme of this kind. Anybody in receipt of such letters will confer a favor on me by communicating with me, so that I can protect myself.

HENRY C. MUELLER.

Le Cananea, Sonora, Jan. 27, 1905.

Gasoline Hoister Efficiency.

Sir—Gasoline engines working to their full capacity, under a constant load, are usually rated by the manufacturers as consuming 0.13 gal. of gasoline per horsepower hour. I do not recall having ever seen any statement regarding the efficiency under conditions of a varying load, such as a gasoline hoist, and the following data may be of some interest to the profession.

The hoister used had a 10-in. cylinder with a 12-in. stroke; and an ignition tube was used for making the explosions. Gasoline from 63 to 65 specific gravity was used. The average gross load hoisted was 1,100 lb. The elevation was 6,000 ft. above sea level. During the year's run, there were consumed 2,965 gal. of gasoline, this consumption including the losses by leakage and evaporation. The hoister was run 535 shifts of 10 hours each, making the hourly consumption of gasoline 0.554 gal. The cost of the gasoline laid down at the mine was $1 per gal. All the costs given below are in Mexican currency.

No record was kept of the time consumed in the hoisting and lowering of the workmen, tools and timbers, but during the year there were hoisted 4,246 tons of waste rock and ore, and 1,885 tons, of 2,000 lb., of water. The greatest hoisting distance was 400 ft. and the average distance to which the loads were hoisted was 322 feet. The total operating expense, per ton of rock and water raised was as follows:

Carmen and dirt passers	29.5	cents
Hoister runners	11.7	"
Top men	8.4	"
Gasoline	48.8	"
Machine oil, cable grease, waste	1.3	"
Total	99.7	"

Reducing the commercial tonnage to horsepower developed, the consumption of gasoline was 0.25 gal. for each commercial horsepower-hour.

Taking into consideration the number of trips made from the different levels, and including the weight of buckets and cable, the consumption of gasoline was 0.19 gal. per horsepower-hour. Notwithstanding the exorbitant price paid for gasoline, the hoisting expenses, per linear meter of development, were $2.29 less than during the previous year, when a large two-cable Mexican whin was operated by four mules.

G. E. KEDZIE.

Durango, Mexico, Jan. 30, 1905.

The first effect of heat, generally speaking, is to produce expansion in the body affected.

Most metals on cooling, contract to their original volume; lead and zinc are exceptions.

Copper oxide is completely dissociated in the electric furnace, small masses of metallic copper being recovered, together with a crystalline double compound of calcium and copper oxides.